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PLIGHT
OF THE
ANCIENT
CITY

SAVING POMPEII

MOCKINGBIRD SINGS AGAIN

HARPER LEE'S
HOMETOWN
AWAITS ITS
NEXT CHAPTER

LEGACY OF THE MAD KING

POLITICS,
POWER AND
MAGNA CARTA

THE PRESENCE OF THE PAST

1 YEAR AGO
FERGUSON,
MISSOURI

100 YEARS AGO
THE ARMENIAN
GENOCIDE

150 YEARS AGO
THE U.S.
CIVIL WAR

PLUS

BRAIN WAVES
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Giant Steps

Sore of foot and short of breath, our reporter explores one of the marvels of the Americas: the famed Inca Road, from Cuzco to long-lost Machu Picchu **BY PATRICK SYMMES**



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Fast Forward 128

COVER: Negligence and decay are taking a toll on the treasures of Pompeii. Illustration by Tran Nguyen

THIS PAGE: A cobblestone street in Ollantaytambo, Peru, a royal estate during Inca times.

«» PAST AND PRESENCE

65 IMAGES AND REFLECTIONS When three acts of violence spanning 150 years are revisited, the visual outcomes are, by turns, sentimental, startling and contemplative

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Contributors



Dan Jones

The best-selling historian (*The Wars of the Roses*, *The Plantagenets*) goes back to the time of King John to commemorate the 800th anniversary of Magna Carta (p. 50). “Getting your head around Magna Carta is fundamental to getting your head around English political history—to understand the roots of the deepest constitutional principles on which much of the English-speaking world agrees,” he says. Jones, who is based in London, is a weekly columnist for the *London Evening Standard* and also contributes to the *Wall Street Journal* and *GQ*. His latest book, *Magna Carta: The Birth of Liberty*, will be published in October.

Patrick Symmes

In *Chasing Che: A Motorcycle Journey in Search of the Guevara Legend*, Symmes rode a motorcycle around South America retracing the path of the Argentine revolutionary. Now Symmes, who is based in Portland, Oregon, returns to the Andes, to walk a portion of the 25,000 miles of the famed Inca roads (p. 94). “The greatest challenge was lack of oxygen at 9,000 feet and above,” he says. “It took me an hour to go half a mile because it was so hard to breathe.”

ILLUSTRATIONS BY Meredith Sadler

Jon Lowenstein

A Guggenheim and a TED Global fellow, Lowenstein is known for his commitment to social justice through photography and short films. Though he had spent years documenting community, poverty and segregation on Chicago’s South Side, he was still appalled when he went to Ferguson last year during the protests (p. 86). “The amount of force that was brought to bear on people was distressing,” he says. Lowenstein opted for black-and-white photos because “it’s a very elemental language that gets to the heart of the matter. I wanted to show that Ferguson was a real grass-roots movement.” Lowenstein’s work has been exhibited around the world and published in *Time* magazine, *Newsweek* and *Mother Jones*.



Diana Markosian

Since October, she has been traveling between Armenia and Turkey to photograph survivors of the Armenian genocide (p. 74), which began 100 years ago. “These individuals who I met were silenced for most of their lives,” Markosian says, “and a century later, to be able to meet them and hear their stories felt like an absolute gift. I just hope I am able to do justice to their voices, so the viewers can have a better sense of what took place in this moment of history.”

Tran Nguyen

Named a Top 10 Designer by *Paste* magazine in 2015, the artist used acrylic and colored pencil to create our cover art. Nguyen was shocked by the corruption involving the archaeological treasure that is Pompeii: “I wanted the snakes to coil around the figure to symbolize how the government and the third parties are suffocating the money that was supposed to go to conserving the sites.” Her illustrations have also been published in *Playboy* and *ImagineFX*.

Eliot Dudik

Using a 100-year-old film camera, the noted photographer captures Civil War landscapes in his evocative “Broken Land” series (p. 66). Dudik is striving to make “a connection between current divides in the country, politically and culturally, and compare them to the time they led up to the Civil War.” His works, including the series “Still Lives,” featuring Civil War re-enactors, have been exhibited in the Morris Museum of Art in Augusta, Georgia, among other venues.



Joshua Hammer

The peripatetic author and former *Newsweek* bureau chief has covered everything from archaeology to crime to military

history for *Smithsonian*. Although he’d worked on many stories in Italy, this was his first visit to Herculaneum and Pompeii (p. 24): “They were both amazing, but I was more struck by Herculaneum. There’s really a sense of a place frozen in time.” Hammer’s book *The Badass Librarians of Timbuktu* comes out in 2016.

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Discussion

Anybody else as
obsessed with lions as
I am? "What makes the
Lion Whisperer roar?"
Awesome story by
@SmithsonianMag

@SavannaTomei ON TWITTER

FROM THE EDITORS Our June cover story captivated readers, who expressed great admiration for Kevin Richardson's work—and concerns for his safety. "He is amazing," Lucy Davis writes on Facebook, "still, these are unpredictable lions and caution is the word of the day." Jennifer C. Ward, a former U.S. ambassador to Niger, was so moved she sent a letter to the ambassador of South Africa calling for an end to commercial lion hunting in the country: "These practices damage South Africa's reputation and the many efforts, both public and private, to conserve endangered species in your country."



Good Napoleon?

The article that examined the Battle of Waterloo and the reign of Napoleon Bonaparte ["Napoleon's Last Charge"] was as historically enlightening as it was relevant to current geopolitical thought. I was unaware of the full extent of Napoleon's progressive political platform. He championed ideas that fuel our desires for equality and freedom. From income inequality to immigration, the Napoleonic concepts of rights and freedoms to the non-aristocrat, proletariat classes are the subject of debate and friction throughout several world theaters.

Barry Watson
BALTIMORE, MARYLAND

Writer Andrew Roberts' admiration for Napoleon is too rosy. Far from being an enlightened progressive, Napoleon was a reactionary who wanted to turn back the clock. He reinstituted slavery in the Caribbean and wasted tens of thou-

sands of lives trying to put down a rebellion when the Haitians objected. By crowning himself emperor, Napoleon, already a military dictator, cast aside even the form of republicanism. The relatives he appointed as kings hardly reflected the ideals of a meritocracy. And does anyone really believe that the former emperor would have been content within the borders of France? Napoleon did change history, but not always for the best.

William Stevenson
HUNTSVILLE, ALABAMA

Native Honor

I was struck by the powerful photograph ["True West"] of a young Nakoda man, but I was disturbed that the accompanying text explains that he was "unnamed." The photographer, Richard Phibbs, says he "aims to restore the 'honor and dignity'" that First Nations people deserve, but to deny this young man the acknowledgment of his own name in no way provides honor or dignity to him.

Melinda Yaskoff
THE PLAINS, OHIO

Lascaux Lives

I was surprised to find myself being quoted by Joshua Hammer in his article "Dream Machine" [April 2015] with a statement I never made. I did not say that the president of France's 2010 visit to Lascaux was a "funeral service." Given my leadership role in preserving the site, for me to say that would be an oxymoron. Mr. Hammer's use of a quotation from the *Independent* does not help our mission to safeguard Lascaux. Instead, it leads the

reader to think that the cave is lost or doomed. Thus Mr. Hammer not only reports inaccurately on its present condition, but induces the fading of its memory in the public's mind. That memory is essential to keep Lascaux alive as one of the most famous World Heritage sites and to hold the people in charge of its paintings accountable for their long-term preservation.

Laurence Léauté Beasley
CHAIR, INTERNATIONAL COMMITTEE
FOR THE PRESERVATION OF LASCAUX
OAKLAND, CALIFORNIA

Corrections

In a brief item we mistakenly implied that James Smithson was born in June. The month of his birth is unknown.

"The Wheel, Re-Invented" said the Eiffel Tower is made of steel. The material is actually wrought iron.

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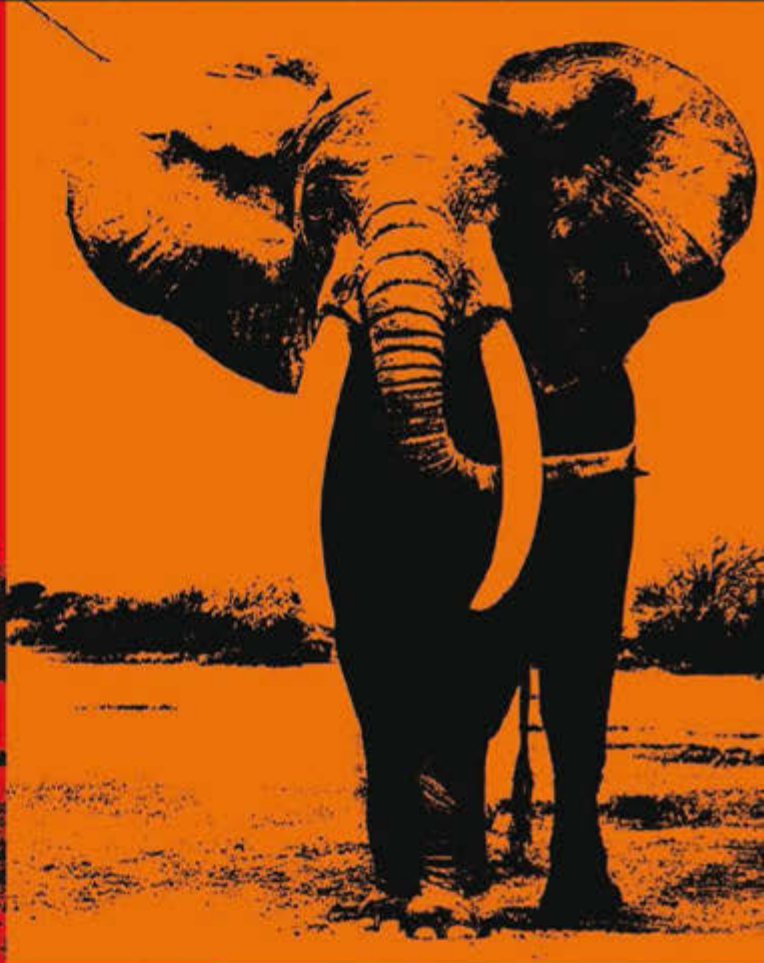
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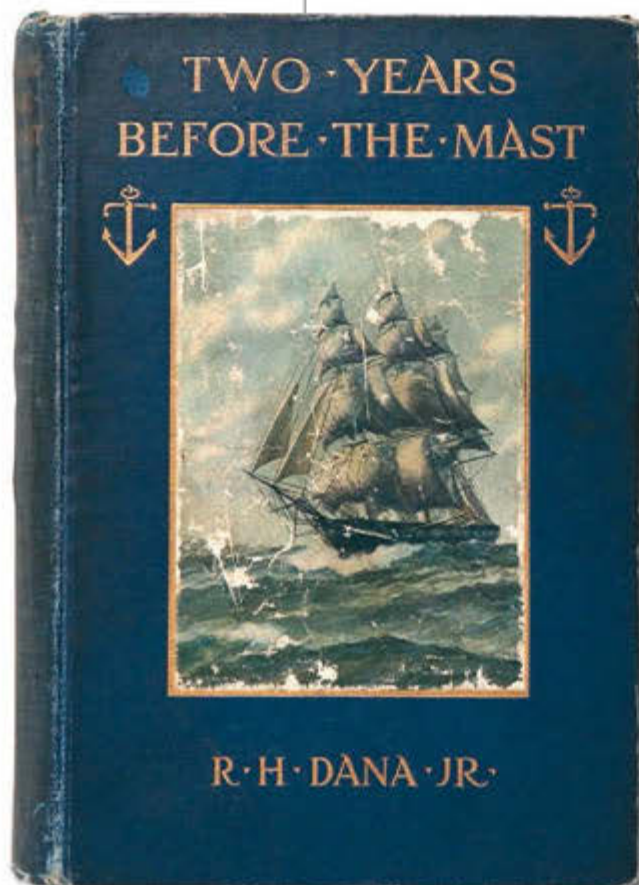
The salty
memoir that beat
Hemingway to
the punch

by Jamie Malanowski

The Young Man and the Sea

On August 14, 1834, nineteen-year-old Richard Henry Dana Jr. made his way to Boston Harbor in search of a two-masted brig called the *Pilgrim*. An archetypal Brahmin—dad was a poet and essayist, granddad had been chief justice of the Massachusetts Supreme Court, great-granddad was one of the original Sons of Liberty—Dana had been a promising student at Harvard College until measles inflamed his corneas and he could no longer read without pain. He resolved to effect a “cure, if possible, by an entire change of life.” Discarding the dress coat and silk cap of an undergraduate, he donned the duck trousers and tarpaulin hat of a sailor.

AMERICAN ICON



The remedy worked, but even more valuable were the experiences that Dana, who was born 200 years ago this August, turned into *Two Years Before the Mast*, one of America's first literary classics. An astonishingly effective memoir of life as an ordinary seaman quartered “before the mast” in the squalid space below decks, the book, a sensation in its own time, is a model of reportage, rife with the nautical jargon of a specialist and an anthropologist's descriptive mastery of life aboard ship and in the *Pilgrim's* then-exotic ports of call. It would influence generations

Melville joked that Dana's descriptions of Cape Horn “must have been written with an icicle.”

of readers and writers and remains a mainstay on American reading lists.

Dana's voyage took him into the south Atlantic Ocean, around Cape Horn, and to Alta California, then a sparsely settled province of Mexico. The ship's mission was to obtain cattle hides from ranchers at San Diego, Santa Barbara and other points along the coast. A naif not yet prejudiced by experience, Dana shares something new on every page: whale songs and icebergs, smashing storms, the captain's violent discipline, the total silence of the sea at night. His vivid writing lacks literary self-consciousness and easily transmits his feelings. When a shipmate falls overboard and dies, Dana's pain is tangible. "At sea, the man is near you—at your side—you hear his voice, and in an instant he is gone, and nothing but a *vacancy* shows his loss. . . . It is like losing a limb."

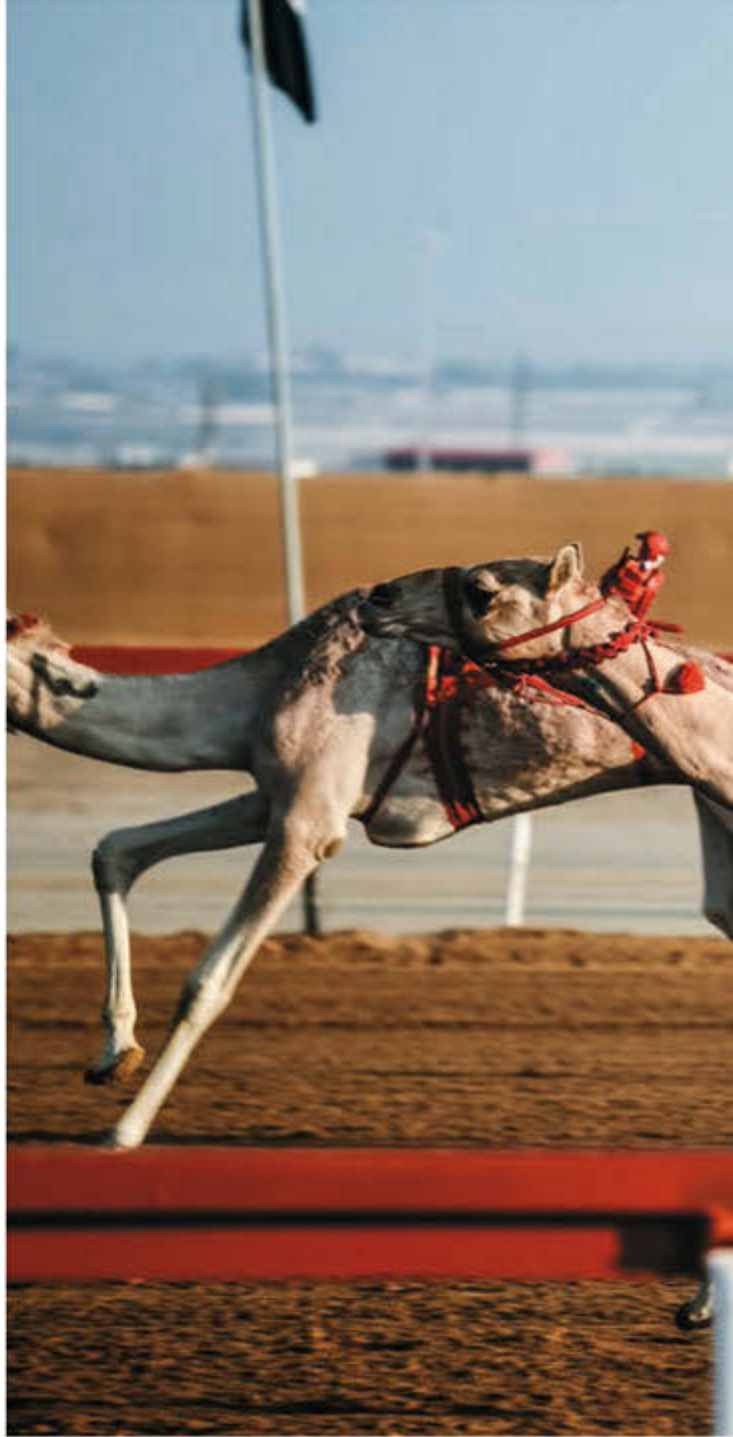
In California, Dana mastered the art of carrying the wide, flat, heavy hides atop his head. From one steep bluff, which Dana called "the only romantic spot on the coast," the sailors pitched the hides onto the beach like giant Frisbees; that spot, some 60 miles south of contemporary Los Angeles, is today a city called Dana Point. But it wasn't all work: Dana went to cockfights, ate frijoles and watched performances of the

fandango. A decade later, forty-niners rushing to California carried *Two Years Before the Mast* as a guidebook.

Dana arrived back in Boston two years older and, in his own words, "a 'rough alley' looking fellow, with duck trousers and red shirt, long hair, and face burnt as dark as an Indian's." He was changed inside as well. He returned to school and became a maritime lawyer and advocate for the rights of sailors and the downtrodden everywhere. He defended fugitive slaves and their rescuers; later, he served as a U.S. attorney.

His book influenced, among others, Herman Melville, who called it "unmatchable." Dana encouraged Melville to ground his whaling story in fact, but Melville was concerned that such an approach could be tedious. "It will be a strange sort of book, tho', I fear," he wrote to Dana. "Blubber is blubber you know; tho' you may get oil out of it, the poetry runs as hard as sap from a frozen maple tree. . . . Yet I mean to give the truth of the thing, spite of this." Of course, *Moby-Dick* is celebrated for just that. And scholars have found Dana's imprint in the heroes of later American works about young men who leave home to find themselves, from Huck Finn to Holden Caulfield to Hemingway's Nick Adams.

Dana was fortunate to establish a thriving legal career. *Two Years Before the Mast* was published in 1840, and though it sold 200,000 copies in its first decade, he'd turned down a deal that would have earned him a 10 percent royalty. Instead he settled for a flat \$250 (not quite \$7,000 today), plus 24 free copies.



Breaking Away

A centuries-old pastime gets a reboot in the United Arab Emirates





ART

Camel racing on the Arabian Peninsula dates to the seventh century, but not long ago the sport underwent a MacGyver-like upgrade: robot jockeys, retrofitted from cordless power drills and dressed in uniforms. British photojournalist **Andrew Testa** captured this race in Abu Dhabi. As the camels galloped at up to 40 miles per hour, he heard the whoosh of the robots' remotely controlled whips, two-foot strips of plastic attached to the drills' motor. The animals' owners sped alongside in SUVs,

muttering encouragement through two-way radios. Camel racing has a troubled past. Child slaves often served as jockeys until the UAE outlawed their use in 2002, which led to robots becoming the industry standard, and though some critics might object to the whips, defenders argue that the practice is no different from horse racing. Testa was drawn to the chance to capture a quirkier side of a region frequently seen through the prism of conflict. "It is a really bizarre spectacle," he says. —AMY CRAWFORD

The First Flight Plan

1 **Dorsal coverts** spread across the base of the flight feathers when the wings are extended, creating a continuous surface.

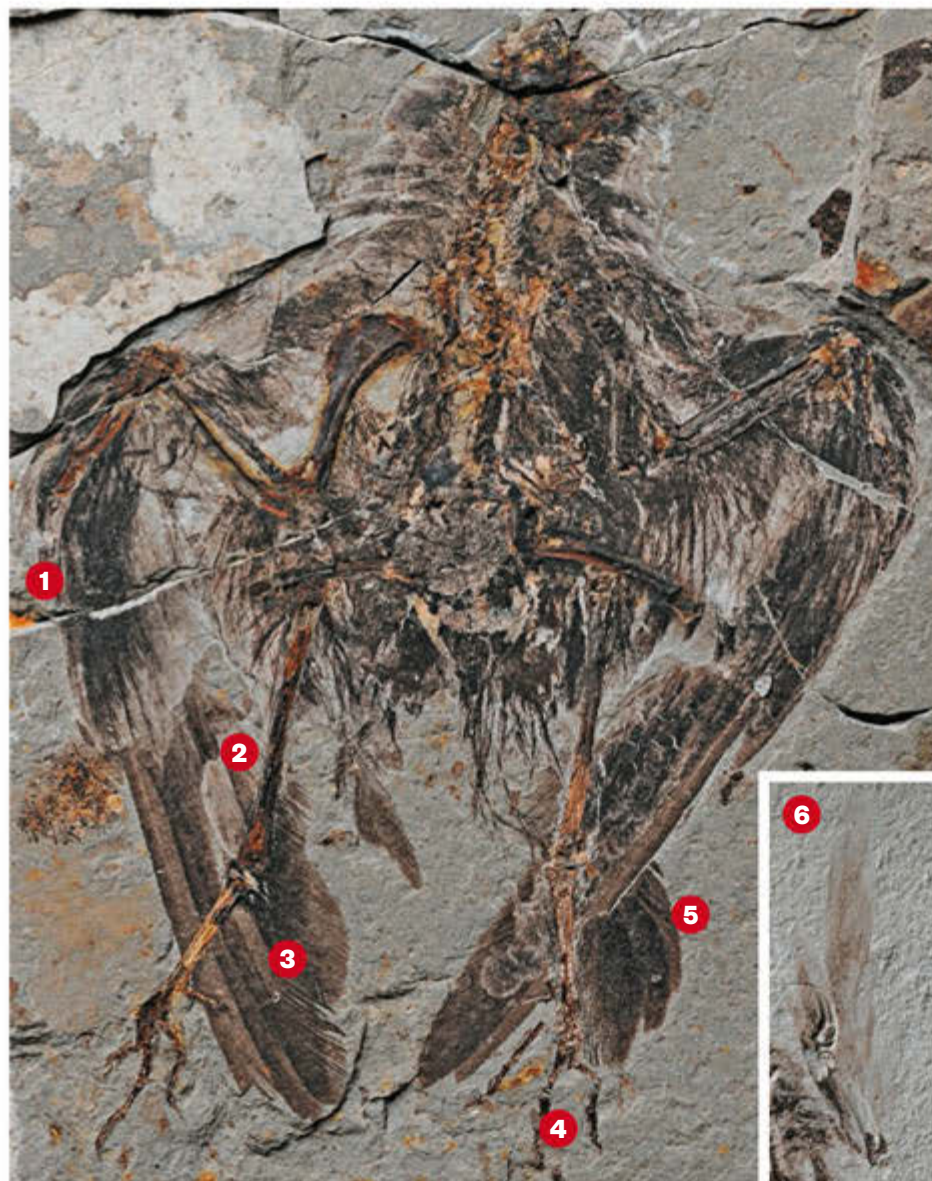
2 The relative length of a leg bone called the **tibiotarsus** is similar to that found in today's wading birds, such as the plover.

3 Visible here are five **primary remiges**, the longest and narrowest of the flight feathers that are attached to a bird's wing.

4 The **claws** on the feet are mostly straight, characteristic of birds that live on the ground, such as chickens or grouse.

5 **Fan-shaped tail feathers**—a common feature in many modern birds—help generate lift during flight.

6 Feathers attached to a small projection known as the **alula** (shown here from a second fossil) aid in slow flight and landing.



A fossil found in China is the oldest known bird with a modern appearance

About 130 million years ago, when pterosaurs still dominated the skies, the bird whose fossil remains are pictured here waded along a lakeshore in northeast China. To paleontologists this ten-inch-tall specimen, recently studied by Min Wang of the Chinese Academy of Sciences and his colleagues, is a giant step forward because it represents the oldest example ever discovered of a modern-looking bird. The bird had fanned tail feathers, fused clavicles (creating a wishbone) and an alula, a wing feature that improves maneuverability during flight. To be sure, it's not the oldest bird; that distinction still belongs to *Archaeopteryx*, which dates to 150 million years ago and is celebrated for showing that birds evolved from dinosaurs. Still, *Archaeopteryx* itself led to an evolutionary dead end, with no descendants alive today. The new species, *Archaeornithura meemannae*, belonged to the group that gave rise to modern birds, and pushes back their earliest known appearance by five million years.

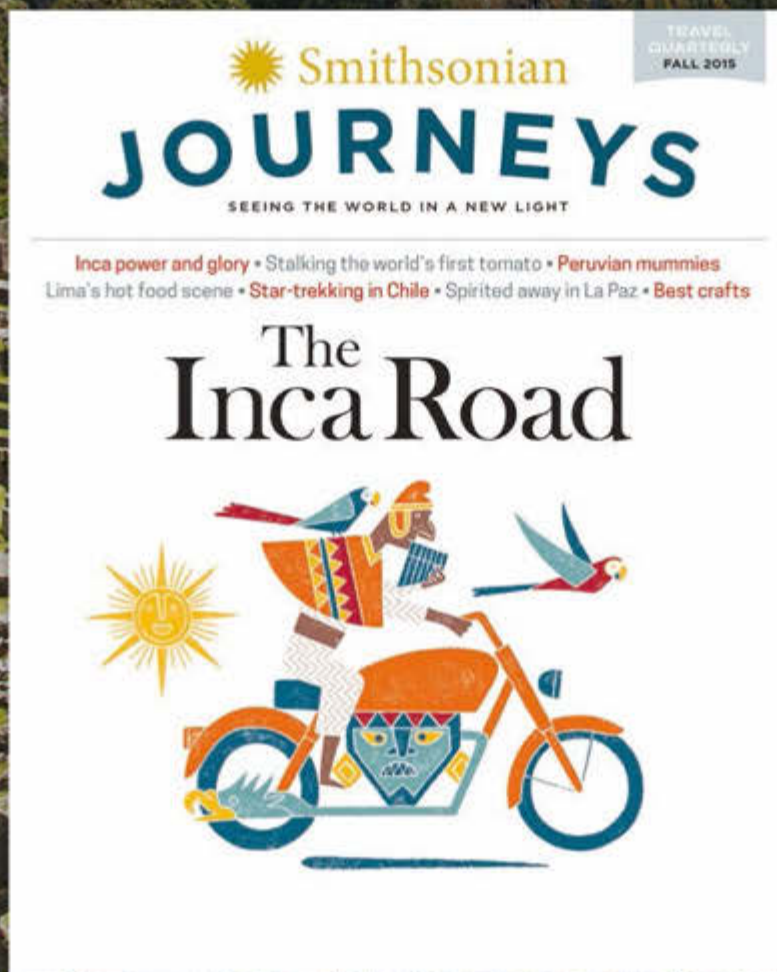
—ELIZABETH QUILL

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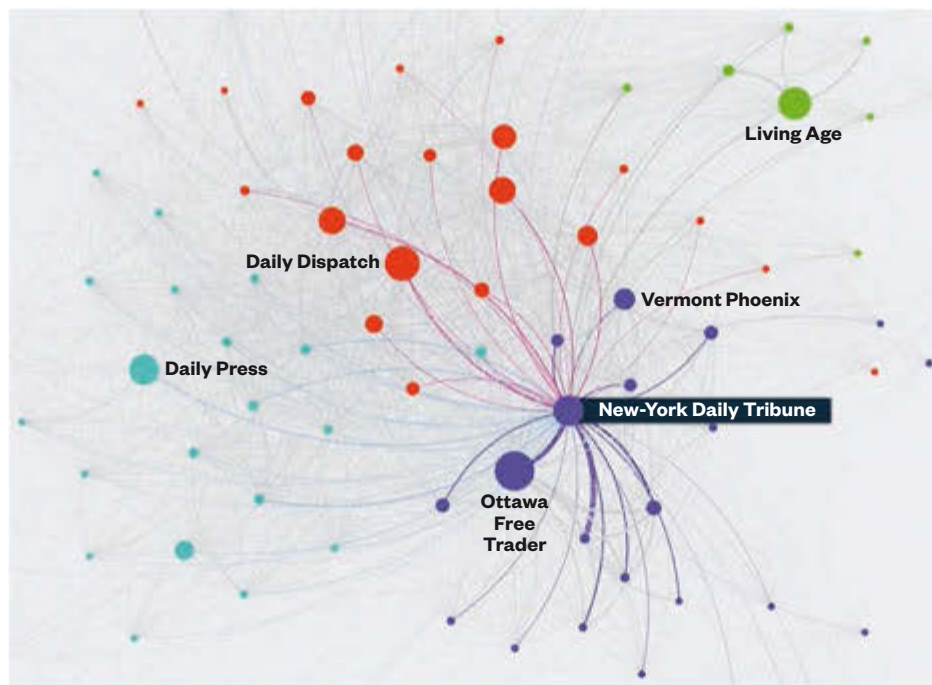


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Vintage Viral

Digital scholars zero in on stories that were trending before the Internet



The *Daily Tribune* often traded content with other papers in purple (lines represent shared text).

If you spend any time online, you've probably come across "Which Classic Rock Band Are You?" or "10 Hours of Walking in New York City as a Woman." But there's a viral sensation you likely missed: "The Fate of the Apostles," a listicle about which of Jesus' followers was "run through the body with a lance" or "stoned and then beheaded." It circulated widely, appearing in a quarter of U.S. media outlets . . . in the 1800s.

The article is a star example from the Viral Texts project at Northeastern University, the largest-scale study ever of how content spread through the social media networks of the 19th century—newspapers. Ana-

lyzing 2.7 million pages from nearly 500 newspapers digitized in the Library of Congress' Chronicling America database, the researchers found that about 650 articles were reprinted 50 times or more, a working definition of "viral" in the industrial age. And the most popular story types would be strangely familiar to Twitter users, says Ryan Cordell, an English professor and co-leader of the research.

Among the trending formats were listicles such as the "Age of Animals" ("a dog lives 20 years; a wolf 20; a fox 15") and questionable health tips, like an item about the tomato ("Dr. Bennett . . . has successfully treated

diarrhoea with this article alone"). Parenting advice was big ("From your child's earliest infancy, inculcate the necessity of instant obedience"), as were tear-jerkers. One vignette purports to be a letter found by a husband after his wife's death: "When this shall reach your eye . . . I shall have passed away for ever, and the old white stone will be keeping its lonely watch over the lips you have so fondly pressed."

The Viral Texts researchers are less interested in the specifics of the stories than in the nature of the networks that spread them. Content today is passed along by users, but these older sharing networks were controlled

by editors, who exchanged subscriptions with editors at other publications during the newspaper boom of the 1800s. And just as today's "influencers" gain outsize followings on social media, some newspapers were better connected than others. A lot of stories passed through Nashville and Wheeling, West Virginia, for example.

Also, much as touchy users today might "unfriend" you on Facebook, editors in those supposedly more genteel times were not above publicly breaking off relationships. Take this editorial from an Alabama paper, written about the *Raleigh Star*: "Having no more occasion for waste paper, we directed our publisher some months since to erase its name from our exchange list."

Of course, viral content moves more quickly now, at a rate that surprises even the experts. In 2013, when Cordell's five kids wanted a puppy, he tried to stall by telling them they had to get a million likes on Facebook first. He figured it would take months. With a cute photo, they did it in seven hours.

Compare that to "The Fate of the Apostles," which appeared in at least 110 publications, from the *Vermont Watchman* to the *Daily Bulletin* in Honolulu. It needed more than 50 years to make the rounds. —BRITT PETERSON

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What did insects evolve from? Nathan McIntosh, Rock Hill, South Carolina

They were once thought to be most closely related to the Myriapoda (centipedes, millipedes and relatives), because of their presumed structural similarity. Most molecular data now indicate that they derive from a branch of the Crustacea and probably originated in an aquatic realm, likely fresh water. *Conrad Labandeira, curator of fossil arthropods, National Museum of Natural History*

If the universe is expanding and everything in it is traveling at the same speed, why would galaxies collide, as

the Milky Way and Andromeda are projected to do? James Rains, Concord, California

There's a competition between the expansion of the universe and the gravitational attraction between galaxies. For galaxies separated by very large distances, the expansion of the universe dominates. But when galaxies are relatively close—such as the Milky Way and Andromeda—we expect that their mutual gravitational attraction will draw them to collide.

Paul Torrey, astronomer, Harvard-Smithsonian Center for Astrophysics

Petroglyphs seem to appear all over the globe. Does this art form date back to a specific time and place, or did it develop independently at several times and places?

Mike Parker, Dimondale, Michigan

Both, you could say. Petroglyphs, or marks carved into rock, appeared as long as 70,000 years ago at sev-

eral distant sites and morphed gradually into images about 35,000 years ago. Undoubtedly somebody, somewhere was the first to carve petroglyphs, but no one today can say who or where. On the other hand, as spreading populations carried the practice around the world, it may have ceased in certain times and places for religious or other reasons, only to be independently restarted hundreds of years later.

William Fitzhugh, anthropologist, National Museum of Natural History

What would happen if the volcano under Yellowstone National Park erupted?

Calvin VanDee, Ithaca, New York

Most likely, there would be “small” hydrothermal eruptions of the reservoirs of steam or hot water that underlie the park’s geysers, hot springs and fumaroles; those explosions could produce craters more than a kilometer wide. The most likely volcanic eruption would be lava flows of either rhyolite or

basalt; the former might also produce ash and pumice. But keep in mind that the probability of such an eruption in any given century is exceedingly low.

Ed Venzke, geologist, Global Volcanism Program, National Museum of Natural History

Do animals have taste buds? Irene Neely, Port Jefferson Station, New York

All animals have taste buds or an equivalent, and they are “tuned” to the nutrients the animals are specialized in. For example, cats can’t (and don’t need to) detect the presence of sugar, while primates surely can. *Mike Maslanka, nutrition scientist, National Zoo*

ILLUSTRATION BY Sarah Wilkins



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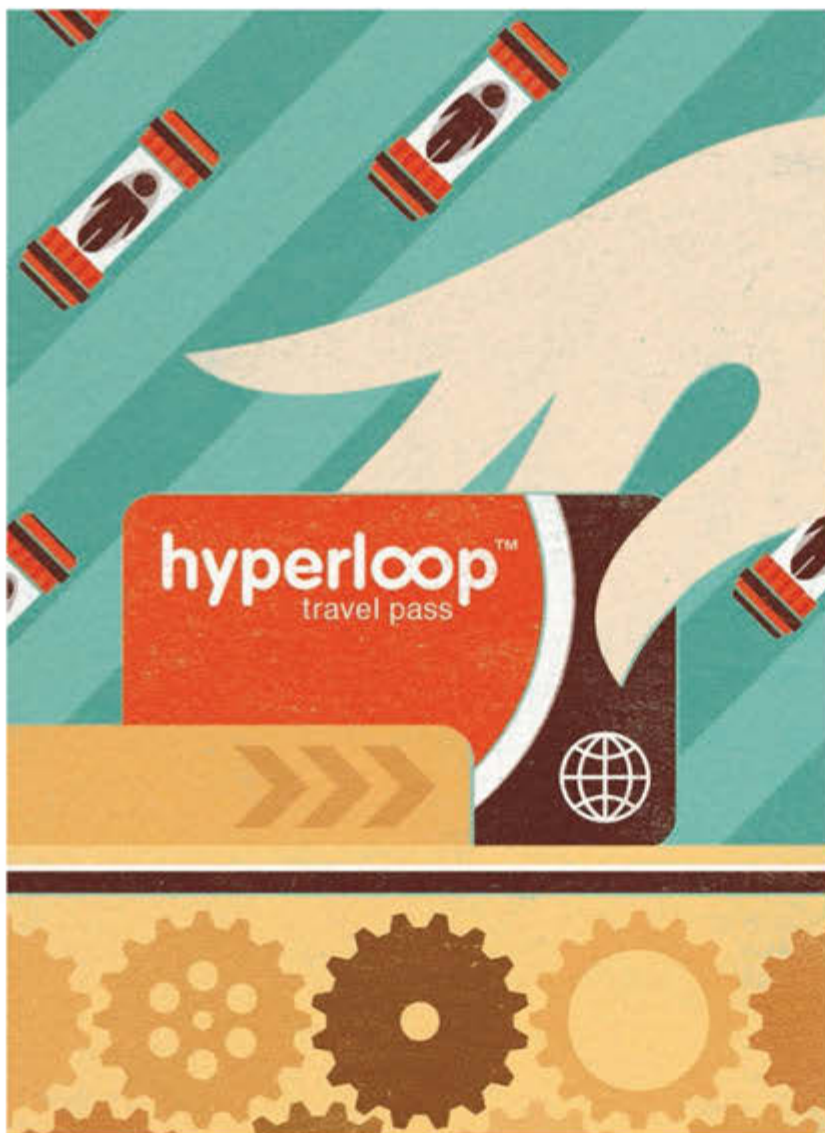
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The Next Pipe Dream

Pneumatic tubes once zapped messages across cities. Could a hyperloop do the same for people?

BY CLIVE THOMPSON *illustration by Zara Picken*

Let's say you're in San Francisco, and suddenly decide, "Hey, let's have dinner at Spago in L.A. tonight!" The fastest way to get there is a 1.5-hour flight, which isn't exactly convenient.

Unless Dirk Ahlborn has his way—in which case you'll be able to make the trip in a mere 36 minutes.

Ahlborn is part of a consortium trying to build the world's first "hyperloop," a radically speedy new form of land-based transportation. To ride a hyperloop, you'd show up at a San Francisco station, and then board a windowless, bullet-shaped capsule. The capsule would sit inside a long tube that stretches from one city to another, raised a few stories aboveground on pylons. A huge air compressor mounted on the capsule would suck air from in front of the vehicle and squirt it out behind—turning the capsule into a rocket. Hovering on a cushion of air (or possibly suspended magnetically) and racing through a vacuum, the hyperloop would face very little friction, so you'd shoot along at a dizzying 760 miles per hour.

The hyperloop was originally proposed in 2012 by the high-tech entrepreneur Elon Musk as a way to kick-start a new generation of superfast land transit. But by late



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2014, Ahlborn—a German-born entrepreneur who co-founded a crowdfunding site for startups—seized on the idea. He assembled a group of 300 engineers willing to work on the concept, forming a company called Hyperloop Transportation Technologies. They plan to break ground next year on a five-mile-long proof of concept. And they're not the only ones: Another group—the nearly identically named Hyperloop Technologies—is composed of several high-tech millionaires and has raised \$8.5 million to develop the technology for transporting cargo. And in January, Musk tweeted that he too plans to build a test hyperloop track for companies and students to use, most likely in Texas.

If it works, proponents claim, hyperloops could transform transportation. You could order a product from

air, steam and liquids to propel quixotic machines, such as “A Jet of Steam Supporting a Sphere.” (“Pneumatic” comes from the Greek *pneumatikos*, for “of the breath.”) By the mid-19th-century industrial revolution, engineers were becoming even more adept at pneumatics. “They were trained on the steam engine. That was the big technology of the age,” says Steven Lubar, a professor of American studies at Brown University. “And they’re really good at making compressed air.”

But what really launched the pneumatic tube was the telegraph. Telegraphs were increasingly important for stock market communications, but they had a “last mile” problem. Telegraphs would arrive at the central telegraph office in a city, whereupon messengers would bring them to financial firms in horse-drawn carts—ponderously slow, especially since city streets were increasingly jammed with traffic. All the delightful, lightning-fast advantages of telegraphy ground to a halt when messages had to move overground.

only one message at a time, but a pneumatic-tube canister could be jammed full of dozens of messages at once. Indeed, one analysis found that a three-inch-wide tube could transmit messages “equivalent to seven telegraph wires and fourteen operators working flat out,” as Tom Standage notes in *The Victorian Internet*. As a bonus, tube-sent messages could be sealed in envelopes, keeping them from prying eyes—not something you could say of a telegraph message, which was always read by the telegraph operator.

“It was the high-frequency trading technology of the day,” says Molly Steenson, an assistant professor of journalism at the University of Wisconsin in Madison. Tube systems quickly emerged for financial centers around the world. Soon the Paris stock exchange had a dozen station nodes, and London’s system had grown to 74 miles of tubes. “Tubes go where commerce goes,” Steenson says.

In the U.S., postmasters gazed enviously at the paper messages rocketing across Europe. By the 1890s, the Postal Service began building municipal tube systems of its own—in Philadelphia, St. Louis, Boston, Chicago and New York. Letter carriers were still needed to go door-to-door, laboriously picking up mail and bringing it to a post office—but at that point tubes took over, shooting the mail across town to other post offices with pneumatic speed. One tube even crossed the Brooklyn Bridge, directly connecting the borough’s post offices to those in Manhattan.

Traffic was conquered. “A wagon might take 12 minutes to go between post offices, but a pneumatic tube might take two,” says Nancy A. Pope, curator at the Smithsonian National Postal Museum. American tubes were so big—up to eight inches in diameter—that a single canister could hold 600 pieces of mail. (New York’s first



The gracefully arcing pipes were fitted with brass connections, the canisters launching with loud shushing sounds. “It was steampunk long before they had steampunk.”

a factory in Detroit and have it arrive in New York the same morning. The entire country could be connected by tubes, squirting humans and goods around at lightning speed.

“It’s doable,” Ahlborn tells me. “It’s feasible. We’re going to build something that people use every day, several times a day.”

If so, it’ll be the triumphant return of a technology that flourished at the outset of the 20th century: the pneumatic tube. One hundred years ago, tubes used blasts of air to change the way we communicate and do business—creating an Internet not of bits, but of matter.

The idea of using air to push things along is, it turns out, quite old. In Greek antiquity, Hero of Alexandria proposed several devices that used compressed

In 1853, a British engineer named J. Latimer Clark proposed a solution: Why not connect the financial firms directly to the telegraph office using pneumatic tubes? When financial messages arrived at the London telegraph office, they’d be placed in a container—such as a cylinder made of gutta-percha, an early form of latex—and loaded into a 1.5-inch-wide tube. A steam engine pump would create a vacuum in the tube, so that any payload placed inside would be sucked rapidly along to its destination. (Later tubes inverted the flow: They’d use steam-engine-driven pumps to blow air into the tubes, pushing the canisters along.)

Financiers loved it. Not only were the tubes fast, but they were high bandwidth. A telegraph wire could transmit

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test canister contained a Bible, a flag and a copy of the Constitution.)

At its peak, the New York City tubes were carrying an astonishing six million letters a day, according to the Postal Service. Postal workers shot canisters off roughly every 15 seconds, with each one racing along at 30 miles an hour. The exchange of mail in New York sped up so quickly it began to resemble today's email or tweets, with recipients trading notes all day long.

"If I'm a wife at home, I'd get a letter from my husband saying, 'The boss is coming to dinner!'" Pope notes. "I'd write back saying, 'OK, what am I serving?' He'd write back saying, 'Pork roast.' And this all happens well before 1 p.m."

The systems were physically gorgeous. The gracefully arcing pipes

were fitted with brass connections, the canisters launching with loud shushing sounds—then popping out at the destination, slightly slick with the oil that lubricated the inside of the tubes. "It was steampunk long before they had steampunk," says Mike Olivier, an amateur historian and engineer in Toronto who has published several papers on pneumatic tubes.

The tubes had their problems, particularly given how complicated they were. Canisters would get stuck, and workers performed arcane rituals to determine where the jam was located. In Paris, they fired guns down the tube and listened for the moment of impact. In the winter the system could clog with ice; in Berlin they poured wine into the tubes to defrost them.

Nonetheless, the lightning speed of the tubes was intoxicating. Pundits declared it was the wave of the future. "The present era is likely to be known to history as the pneumatic age," exulted the *Washington Post* in 1893.

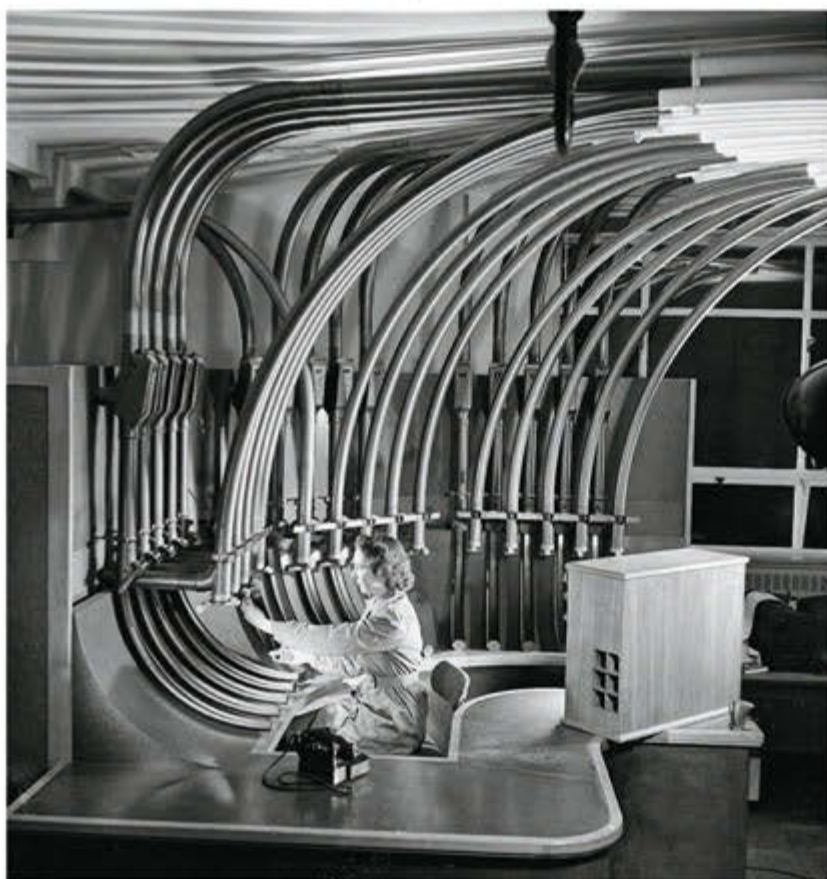
Forced-air systems were like "little tornadoes caught and trained to serve you," as the founder of the Daniels & Fisher department store said. The magazine *Compressed Air* devoted pages to the new industry.

"It represented efficiency, the marvel of instantaneous communication," says Shannon Mattern, a faculty member in media studies at the New School.

In a precursor to the hyperloop, people didn't just move messages through tubes. They moved objects, particularly in companies and stores that built internal tube systems. Department stores blasted cash and small products like jewelry through for delivery. They located their cashiers in a central office to keep the money supply in a safe location—with shop-floor sales agents shooting customers' payments there, then receiving change in "less than a minute," as *Scientific American* marveled in 1903. ("Pneumatic Tubes Supersede Cash Boys," cheered the *Monthly Journal of the Brotherhood of Locomotive Engineers*.) Tubes even transmitted power. Paris, which developed the world's largest pneumatic-messaging network, also created a system for powering public clocks by compressed air. Indeed, the engineers building the Niagara Falls power project initially considered using the mammoth falls to generate compressed air that would be sent via pneumatic tube to Buffalo to power devices there.

Visionaries predicted that ever huger tube networks would emerge, allowing shops to deliver goods right to the home. A magazine writer even giddily called for tubes to deliver food in Berlin. ("With the elimination of all stoves and ovens in the home, the fame of German women for tasty cooking may soon pass into obscurity," he wrote.)

The ultimate dream? Moving people. Science fiction authors



Tubes delivered documents from the floor of a typewriter factory in England in 1954.



TECHNOLOGY TUBES

of the day wrote wild tales of humans riding in air-blown vehicles. In the short story “In the Year 2889,” Jules Verne described people riding in pneumatic tubes “which convey them with a speed of a thousand miles an hour.” In New York, before the construction of the city’s subway, the entrepreneur Alfred Beach wanted to build an entirely air-propelled system, going so far as to actually construct a one-block underground test track beneath Broadway. But he couldn’t get investors interested because the physics seemed too unsettling.

“Everyone was worried that the start and stop would be so violent, everybody would get whiplash,” Pope says.

Indeed, the very physicality of pneumatic tube systems is what, in the end, led to their demise.

After World War I, as U.S. cities grew rapidly, post offices needed to relocate. But that required tearing up and moving the tube systems—a brutally expensive endeavor. What’s more, a rival technology had emerged: the truck. Trucks could move large masses of mail around quite cheaply and quickly, and they also finally allowed for “parcel post,” the easy shipping of big packages. Tubes couldn’t compete with that. By the 1950s, many urban systems in the U.S. had been shut down, and the New York system was finally shuttered in 1953.

Europe held on a bit longer. The Parisian tube system operated until 1984, right up into the computer age. Prague had a tube network functioning until 2002, when flooding so damaged the hardware that the system was permanently shuttered.

Even as the digital age dawned, pneumatic tubes still felt somehow like a superior technology, a glimpse of a future that should have been. “If the equipment is old, the idea is terribly modern,” Jacques Lepage, di-

rector of a pneumatic-transport firm in Paris, said in 1984. “You can move things around extraordinarily quickly through the system here.”

In the next few years, we should know if the hyperloop can reboot the dreams of pneumatic transport. Dirk Ahlborn and his team aim to begin work on a trial system—a five-mile line—in Quay Valley, California. By 2018, he thinks he’ll be able to convey human passengers. Meanwhile, the rival team at Hyperloop Technologies is designing its own prototype at a converted factory in Los Angeles.

But will anyone want to ride in such a device? Wouldn’t it seem claustrophobic, like being jammed inside a metal tube?

Sure, says Ahlborn. But that’s al-

intended. But if pneumatic transport happens, it would reshape cities and countries around the world. Ahlborn predicts it would be much cheaper than air or traditional rail—in fact, a ride between two cities a few hundred miles apart could cost just \$30 one way. And if you could ship just-in-time products across state lines in mere hours, manufacturing could bloom in inexpensive, underdeveloped areas. Entirely new bedroom towns could emerge, far from major urban centers.

“What if someone built a community that’s 40 miles away, that’s cheap and nice, and you built a hyperloop to connect to it?” he asks. “In Quay Valley, a house could cost you \$250,000, with top-of-the-line tech, a walkable green city, and within minutes you’re in L.A. or San Francisco. What kind of influence would it have on a city like Detroit?”

It sounds like Jules Verne. Yet there’s a whiff of practicality, too. After all, the dream of pneumatics has never entirely died. The big, citywide postal systems are gone, but many companies

It sounds like Jules Verne. Yet there’s a whiff of practicality, too. After all, the dream of pneumatics has never entirely died. Many companies still use internal tube systems.

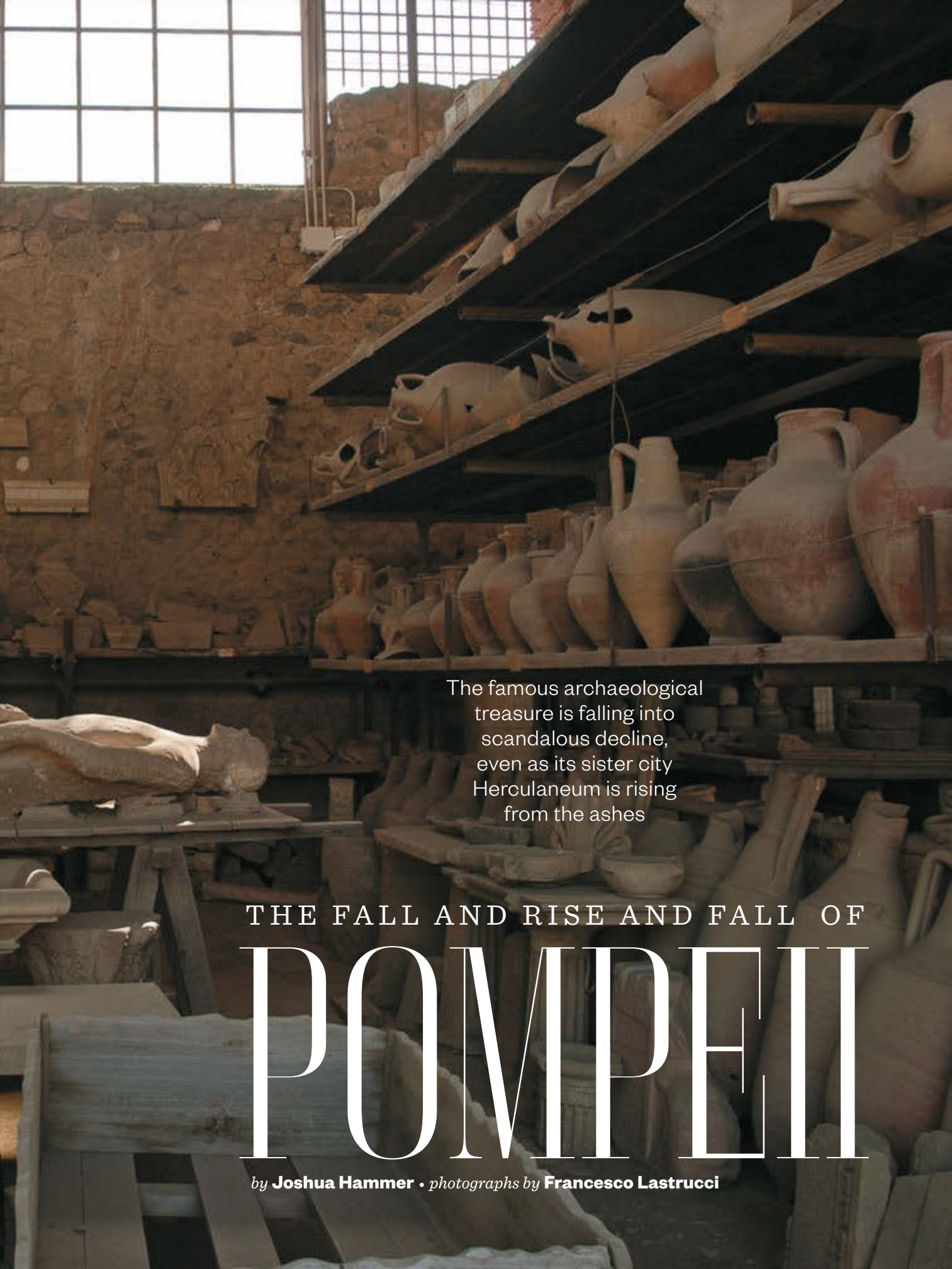
ready what a lot of modern transport feels like. “It’s probably very much like what you already know from driving in a car, from being in a plane. I just came back from Dubai and the airplane was traveling over 500 miles an hour.” The harder questions, really, are the zillions of engineering challenges—like “acceleration and deceleration.” The hyperloop can’t launch off too quickly or people will be uncomfortable or even black out. Even more challenging are the politics, such as acquiring the right of way to build the tubes. California is sufficiently congested that even Ahlborn thinks that, practically, an L.A.-to-San Francisco ride would come much later than in other parts of the country, or even other countries.

The hyperloop is a long shot, pun

still use internal tube systems to move physical things around quickly. Hospitals are holdouts: Stanford University Hospital has four miles of tubes through which staff shoot lab samples and medication back and forth, traveling up to a quarter of a mile in under three minutes. And the flagship Swatch store in Manhattan uses tubes to blast watches up from inventory.

In an age where the Internet has accelerated our bits and bytes, there’s still some value, it seems, in accelerating our atoms. ○





The famous archaeological
treasure is falling into
scandalous decline,
even as its sister city
Herculaneum is rising
from the ashes

THE FALL AND RISE AND FALL OF
POMPEII

by **Joshua Hammer** • *photographs by* **Francesco Lastrucci**



In a sweltering summer afternoon, Antonio Irlando leads me

down the Via dell'Abbondanza, the main thoroughfare in first-century Pompeii. The architect and conservation activist gingerly makes his way over huge, uneven paving stones that once bore the weight of horse-drawn chariots. We pass stone houses richly decorated with interior mosaics and frescoes, and a two-millennial-old snack bar, or Thermopolium, where workmen long ago stopped for lunchtime pick-me-ups of cheese and honey. Abruptly, we reach an orange-mesh barricade. "Vietato L'Ingresso," the sign says—entry forbidden. It marks the end of the road for visitors to this storied corner of ancient Rome.

Just down the street lies what Turin's newspaper *La Stampa* called Italy's "shame": the shattered remains of the Schola Ar-

maturarum Juventus Pompeiani, a Roman gladiators' headquarters with magnificent paintings depicting a series of Winged Victories—goddesses carrying weapons and shields. Five years ago, following several days of heavy rains, the 2,000-year-old structure collapsed into rubble, generating international headlines and embarrassing the government of then-Prime Minister Silvio Berlusconi. The catastrophe renewed concern about one of the world's greatest vestiges of antiquity. "I almost had a heart attack," the site's archaeological director, Grete Stefani, later confided to me.

Since then this entire section of Pompeii has been closed to the public, while a committee appointed by a local judge investigates the cause of the collapse. "It makes me angry to see this," Irlando, a genial

59-year-old with a mop of graying hair, tells me, peering over the barrier for a better look.

Irlando enters the nearby Basilica, ancient Pompeii's law court and a center of commerce, its lower-level colonnade fairly intact. Irlando points out a stone lintel balanced on a pair of slender Corinthian columns: Black blotches stain the lintel's underside. "It's a sign that water has entered into it, and it's created mold," he tells me with disgust.

A few hundred yards away, at the

southern edge of the ruins, we peer past the cordoned-off entrance to another neglected villa, in Latin a *domus*. The walls sag, the frescoes are fading into a dull blur, and a jungle of chest-high grass and weeds chokes the garden. "This one looks like a war zone," says Irlando.

Since 1748, when a team of Royal Engineers dispatched by the King of Naples began the first systematic excavation of the ruins, archaeologists, scholars and ordinary tourists have crowded Pompeii's cobblestone streets

for glimpses of quotidian Roman life cut off *in medias res*, when the eruption of Mount Vesuvius suffocated and crushed thousands of unlucky souls. From the amphitheater where gladiators engaged in lethal combat, to the brothel decorated with frescoes of couples in erotic poses, Pompeii offers unparalleled glimpses of a distant time. "Many disasters have befallen the world, but few have brought posterity so much joy," Goethe wrote after touring Pompeii in the 1780s.



Architect Antonio Irlando castigates the neglect that has led to widespread deterioration throughout Pompeii (the arch of the Temple of Venus, below, collapsed after heavy rains in 2014). “The worst part,” he says, “is that a dozen more buildings could fall down at any time.”

But the Pompeii experience has lately become less transporting. Pompeii has suffered devastating losses since the Schola Armaturarum collapsed in 2010. Every year since then has witnessed additional damage. As recently as February, portions of a garden wall at the villa known as the Casa di Severus gave way after heavy rains. Many other dwellings are disasters in the making, propped up by wooden struts or steel supports. Closed-off roads have been colonized by moss and grass, shrubs sprout from cracks in marble pedestals, stray dogs snarl at passing visitors.

A 2011 Unesco report about the problems cited everything from “inappropriate restoration methods and a general lack of qualified staff” to an inefficient drainage system that “gradually degrades both the structural condition of the buildings as well as their decor.” Pompeii has also been plagued by mismanagement and corruption. The grounds are littered with ungainly construction projects that squandered millions of euros but were never completed or used.

In 2012, Irlando discovered that an emergency fund set up by the Italian government in 2008 to shore up ancient buildings was instead spent on

And Pompeii continues to amaze with fresh revelations. A team of archaeologists recently studied the latrines and drains of several houses in the city in an effort to investigate the dietary habits of the Roman empire. Middle- and lower-class residents, they found, had a simple yet healthy diet that included lentils, fish and olives. The wealthy favored fattier fare, such as suckling pig, and dined on delicacies including sea urchins and, apparently, a giraffe—although DNA evidence is currently being tested. “What makes Pompeii special,” says Michael MacKinnon of the University of Winnipeg, one of the researchers, “is that its archaeological wealth encourages us to reanimate this city.”



inflated construction contracts, lights, dressing rooms, a sound system and a stage at Pompeii's ancient theater. Rather than creating a state-of-the-art concert venue, as officials claimed, the work actually harmed the historic integrity of the site.

Irlando's investigation led to government charges of "abuse of office" against Marcello Fiori, a special commissioner given carte-blanche power by Berlusconi to administer the funds. Fiori is accused of having misspent €8 million (\$9 million) on the amphitheater project. In March, Italian authorities seized nearly €6 million (\$7 million) in assets from Fiori. He has denied the accusations.

Caccavo, the Salerno-based construction firm that obtained the emergency-fund contracts, allegedly overcharged the state on everything from gasoline to fire-prevention materials. Its director was placed under house arrest. Pompeii's director of restoration, Luigi D'Amora, was arrested. Eight individuals are facing prosecution for charges including misallocation of public funding in connection with the scandal.

"This was a *truffa*, a scam," says Irlando, pointing out a trailer behind the stage where the police have stored theatrical equipment as evidence of corruption. "It was all completely useless."

Administrative malpractice is not unheard of in Italy, of course. But because of the historic importance and popular appeal of Pompeii, the negligence and decay in evidence there are beyond the pale. "In Italy, we have the greatest collection of treasures in the world, but we don't know how to manage them," says Claudio D'Alessio, the former mayor of the modern city of Pompei, founded in 1891 and located a few miles from the ruins. A recent editorial in Milan's *Corriere della Sera* declared that Pompeii's disastrous state was "the symbol of all the sloppiness and inefficiencies of a country that has lost its good sense and has not managed to recover it."

For its part, Unesco issued an ultimatum in June 2013: If preservation and restoration efforts "fail to deliver substantial progress in the next two



Doomed by proximity to Vesuvius, the two cities were entombed within a day (Pompeii's monuments, right, include the Arch of Tiberius). Accounts at the time documented the spread of the ash cloud beyond Rome, as far as Egypt and Syria.

years," the organization declared, Pompeii could be placed on the List of World Heritage in Danger, a designation recently applied to besieged ancient treasures such as Aleppo and the Old City of Damascus in Syria.

Pompeii's troubles have come to light at the very moment that its twin city in first-century tragedy—Herculaneum—is being celebrated for an amazing turnaround. As recently as 2002, archaeologists meeting in Rome said Herculaneum was the "worst example of archaeological conservation in a non-war torn country." But since then, a private-public partnership, the Herculaneum Conservation Project, established by the American philanthropist David W. Packard, has taken charge of the ancient Roman resort town by the Bay of Naples and restored a semblance of its former grandeur. In 2012, Unesco's director general praised Herculaneum as a model "whose best practices surely can be replicated in other similar vast archaeological areas across the world" (not to mention down the road at Pompeii).

Herculaneum's progress made news just a few months ago, when researchers at the National Research Council in Naples announced a solution to one of archaeology's greatest challenges: reading the texts of papyrus scrolls cooked at Herculaneum by the fiery py-



roclastic flow. Scientists had employed every imaginable tactic to unlock the secrets of the scrolls—prying them apart with unrolling machines, soaking them in chemicals—but the writing, inscribed in carbon-based ink and indistinguishable from the carbonized papyrus fibers, remained unreadable. And unspooling the papyrus caused further damage to the fragile material.



The researchers, headed by physicist Vito Mocella, applied a state-of-the-art method, X-ray phase-contrast tomography, to examine the writing without harming the papyrus. At the European Synchrotron Radiation Facility in Grenoble, France, high-energy beams bombarded the scrolls and, by distinguishing contrasts between the slightly raised inked let-

ters and the surface of the papyrus, enabled scientists to identify words, written in Greek. It marked the beginnings of an effort that Mocella calls “a revolution for papyrologists.”

It was on the afternoon of August 24, A.D. 79, that people living around long-dormant Mount Vesuvius watched in awe as flames shot sud-

denly from the 4,000-foot volcano, followed by a huge black cloud. “It rose to a great height on a sort of trunk and then split off into branches, I imagine because it was thrust upwards by the first blast and then left unsupported as the pressure subsided,” wrote Pliny the Younger, who, in a letter to his friend, the historian Tacitus, recorded the events he wit-

nessed from Misenum on the northern arm of the Bay of Naples, about 19 miles west of Vesuvius. “Sometimes it looked white, sometimes blotched and dirty, according to the amount of soil and ashes it carried with it.”

Volcanologists estimate that the eruptive column was expelled from the cone with such force that it rose as high as 20 miles. Soon a rain of soft pumice, or *lapilli*, and ash began falling over the countryside. That evening, Pliny observed, “on Mount Vesuvius broad sheets of fire and leaping flames blazed at several points, their bright glare emphasized by the darkness of night.”

Many people fled as soon as they saw the eruption. But the lapilli gathered deadly force, the weight collapsing roofs and crushing stragglers as they sought protection beneath staircases and under beds. Others choked to death on thickening ash and noxious clouds of sulfurous gas.

In Herculaneum, a coastal resort

At Herculaneum (where sights include a bust of Apollo, in the baths, opposite; skeletons, below), the end came swiftly. Scientists believe that surging gas and molten rock hurtled down the slopes of Vesuvius at more than 100 miles an hour.

the earth like a flood.” Mother and son joined a crowd of wailing, shrieking and shouting refugees who fled from the city. “At last the darkness thinned and dispersed into smoke or cloud; then there was genuine daylight. . . . We returned to Misenum . . . and spent an anxious night alternating between hope and fear.” Mother and son both survived. But the area around Vesuvius was now a wasteland, and Herculaneum and Pompeii lay entombed beneath a congealing layer of volcanic material.

The two towns remained largely undisturbed, lost to history, through the rise of Byzantium, the Middle Ages and the Renaissance. In 1738, Maria

ily through the softer deposits of pumice and ash, unearthing streets, villas, frescoes, mosaics and the remains of the dead. “Stretched out full-length on the floor was a skeleton,” C.W. Ceram writes in *Gods, Graves and Scholars: The Story of Archaeology*, a definitive account of the excavations, “with gold and silver coins that had rolled out of bony hands still seeking, it seemed, to clutch them fast.”

In the 1860s a pioneering Italian archaeologist at Pompeii, Giuseppe Fiorelli, poured liquid plaster into the cavities in the solidified ash created by the decomposing flesh, creating perfect casts of Pompeii’s victims at the moment of their deaths—down to the folds in their togas, the straps of their sandals, their agonized facial expressions. Early visitors on the Grand Tour, like today’s tourists, were thrilled by these morbid tableaux. “How dreadful are the thoughts which such a sight suggests,” mused

“If you were here 2,000 years ago, you would **approach by boat** and pull up on a beach,” says Farella, leading me along a ramp past the arches opening to the skeletons.

town about one-third Pompeii’s size, located on the western flank of Vesuvius, those who elected to stay behind met a different fate. Shortly after midnight on August 25, the eruption column collapsed, and a turbulent, superheated flood of hot gases and molten rock—a pyroclastic surge—rolled down the slopes of Vesuvius, instantly killing everyone in its path.

Pliny the Younger observed the suffocating ash that had engulfed Pompeii as it swept across the bay toward Misenum on the morning of August 25. “The cloud sank down to earth and covered the sea; it had already blotted out Capri and hidden the promontory of Misenum from sight. Then my mother implored, entreated and commanded me to escape as best I could. . . . I refused to save myself without her and grasping her hand forced her to quicken her pace. . . . I looked round; a dense black cloud was coming up behind us, spreading over

Amalia Christine, a nobleman’s daughter from Saxony, wed Charles of Bourbon, the King of Naples, and became entranced by classical sculptures displayed in the garden of the royal palace in Naples. A French prince digging in the vicinity of his villa on Mount Vesuvius had discovered the antiquities nearly 30 years earlier, but had never conducted a systematic excavation. So Charles dispatched teams of laborers and engineers equipped with tools and blasting powder to the site of the original dig to hunt more treasures for his queen. For months, they tunneled through 60 feet of rock-hard lava, unearthing painted columns, sculptures of Roman figures draped in togas, the bronze torso of a horse—and a flight of stairs. Not far from the staircase they came to an inscription, “Theatrum Herculense.” They had uncovered a Roman-era town, Herculaneum.

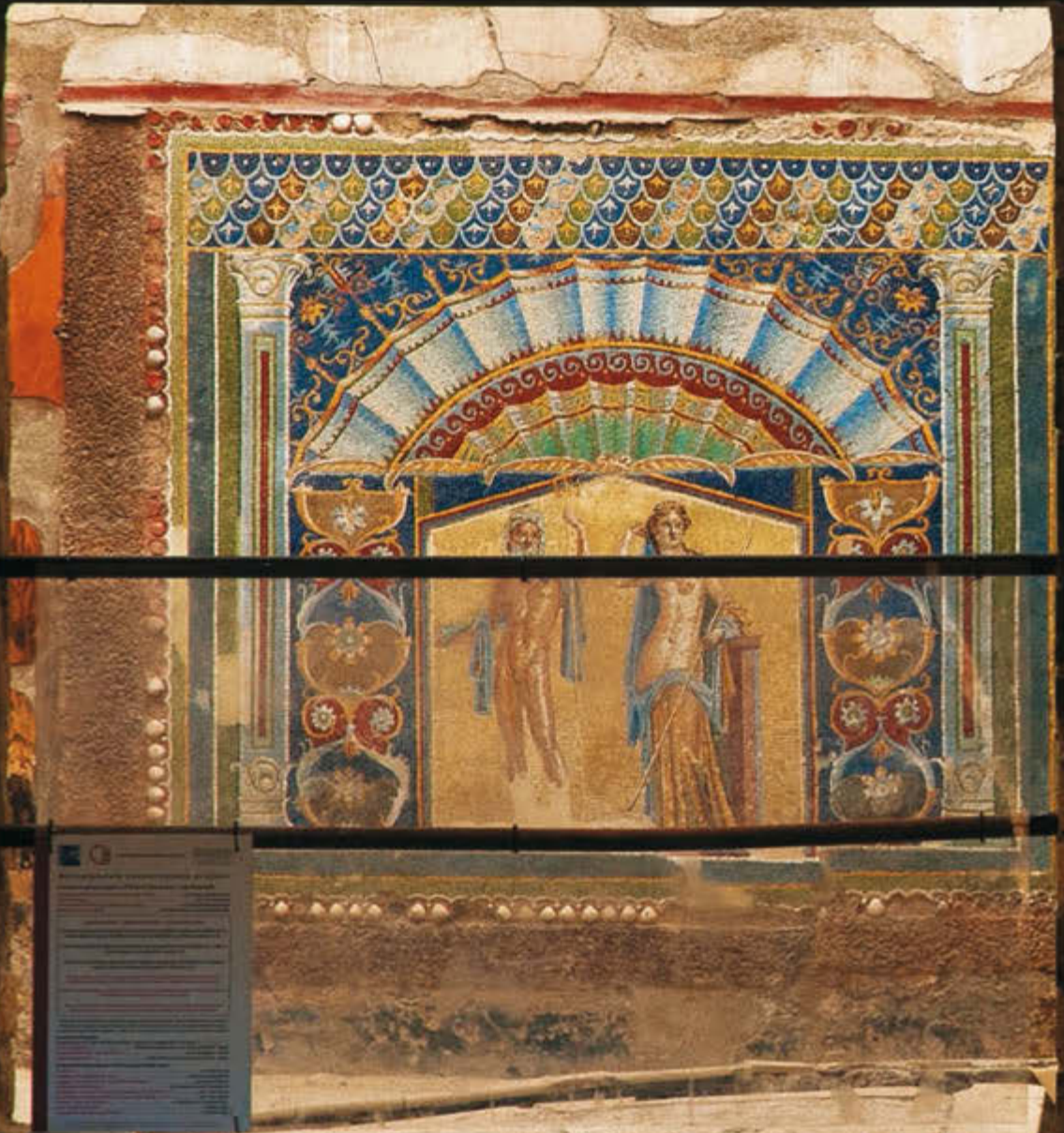
Digging began in Pompeii ten years later. Workers burrowed far more eas-

the English writer Hester Lynch Piozzi, who visited Pompeii in the 1780s. “How horrible the certainty that such a scene might be all acted over again tomorrow; and that, who today are spectators, may become spectacles to travelers of a succeeding century.”

Herculaneum remained accessible only by tunnels through the lava until 1927, when teams supervised by Amedeo Maiuri, one of Italy’s pre-eminent archaeologists, managed to expose about a third of the buried city, around 15 acres, and restore as faithfully as possible the original Roman constructions. The major excavations ended in 1958, a few years before Maiuri’s retirement in 1961.

I’m standing on a platform suspended above Herculaneum’s ancient beachfront, staring down at a grisly scene. Inside stone archways that framed the entrance to a series of boat houses, 300 skeletons huddle, frozen





Herculaneum's treasures include a mosaic depicting Neptune and his sea-goddess wife Amphitrite, inside a villa that was restored in 2012.





for eternity in positions they had assumed at the moment of their deaths. Some sit propped against stones, others lie flat on their backs. Children nestle between adults; a few loners sit by themselves. “They didn’t know what was going to happen to them. Maybe they were all waiting for rescue,” says Giuseppe Farella, a conservator. Instead, they were overcome by a 1,000-degree Fahrenheit avalanche of gas, mud and lava, which burned the flesh off their bones, then buried them. “It must have been very painful, but very fast,” says Farella.

The exhibit, which opened in 2013, is among the latest initiatives of the Herculaneum Conservation Project, supported by the Packard Humanities Institute in Los Altos, California (founded by David W. Packard, an heir to the Hewlett-Packard fortune), in partnership with the British School at Rome, and the Superintendency for the Archaeological Heritage of

At Pompeii, EU-financed efforts include shoring up facades (opposite, top) and cleaning frescoes (below). At the site in March, culture minister Dario Franceschini declared: “Italy is proud to say to the world that we have turned a page.”

ing off walls. Roofs were collapsing. It was a disaster.”

Herculaneum, of course, faced cronyism and financial shortages that Pompeii has today. But Packard staffers took advantage of private money to hire new specialists. One of the site’s biggest problems, lead architect Paola Pesaresi tells me as we walked the grounds, was water. The ancient city sits some 60 feet below the modern city of Herculaneum, and rain and groundwater tends to collect in pools, weakening foundations and destroying mosaics and frescoes. “We had to find a delicate way to prevent all this water from coming in,” she says. The project hired engineers to resurrect the Roman-era sewage sys-

cotta-and-wood roofs, richly frescoed walls, mosaic floors, beamed ceilings and soaring atriums.

Pesaresi leads me into the Casa del Bel Cortile, a recently renovated, two-story home with an open skylight, a mosaic-tiled floor and a restored roof protecting delicate murals of winged deities posed against fluted columns. Unlike Pompeii, this villa, as well as numerous others in Herculaneum, conveys a sense of completeness.

Art restorers are stripping away layers of paraffin that restorers applied between the 1930s and 1970s to prevent paint from cracking on the city’s magnificent interior frescoes. “The early restorers saw that the figurative scenes were flaking, and they asked themselves, ‘What can we do?’” Emily MacDonald-Korth, then of the Getty Conservation Institute, tells me during a lunch break inside a two-story villa on the Decumanus Maximus. The wax initially worked as a kind of glue, hold-

Two contractors were dabbing the paintings with outsize cotton swabs, dissolving wax. “This stuff has been **building up for more than 50 years**,” one of the workers told me.

Naples and Pompeii, the government body that administers the site. Since the project’s founding in 2001, it has spent €25 million (\$28.5 million) on initiatives that have revitalized these once-collapsing ruins.

The project began to take shape one evening in 2000, when Packard (who declined to be interviewed for this article) considered ideas for a new philanthropic endeavor with his friend and renowned classics scholar Andrew Wallace-Hadrill, then director of the British School at Rome. Hadrill recommended Herculaneum. “The superintendent showed [Packard] around the site; two-thirds was closed to the public because it was falling down,” Sarah Court, the project’s press director, tells me in a trailer beside the ruins. “Mosaics were crumbling, frescoes were fall-

tem—tunnels burrowed three to six feet beneath the ancient city—two-thirds of which had already been exposed by Maiuri. They also installed temporary networks of aboveground and underground drainpipes. Pesaresi ushers me through a tunnel chiseled through the lava at the entrance to the ruins. Our conversation is nearly drowned out by a torrent of water being pumped from beneath Herculaneum into the Bay of Naples.

We stroll down the Decumanus Maximus, a street where public access has long been quite limited, because of the danger of falling stones and collapsing roofs. After millions of dollars of work, the facades are secure and the houses are dry; the street fully opened in 2011. Workers have painstakingly restored several two-story stone houses, piecing together original lintels of carbonized wood—sealed for 2,000 years in their oxygen-less tomb—along with terra-

ing the images together, but ultimately speeded the frescoes’ disintegration. “The wax bonded with the paint, and when water trapped behind the walls sought a way of coming out, it pushed the paint off the walls,” she explains. For some years, the Getty Institute has experimented with laser techniques to restore frescoes, employing a noninvasive approach that strips away wax but leaves paint untouched. Now the Getty team has applied that technique at Herculaneum. “We’re doing this in a controlled way. It won’t burn a hole through the wall,” MacDonald-Korth says.

In 1982, the site’s then director, Giuseppe Maggi, uncovered the volcanic sands of buried Herculaneum’s ancient seafront, as well as a 30-foot-long wooden boat, hurled ashore during the eruption by a seismic tremor-created tsunami. It was Maggi who uncovered the 300 victims of Vesuvius, along with their belongings, including amulets, torches and money. One skeleton,



See more of Lastrucci’s Pompeii and Herculaneum photos at Smithsonian.com/pompeii

nicknamed “the Ring Lady,” was bedecked in gold bracelets and earrings; her rings were still on her fingers. A soldier wore a belt and a sword in its sheath, and carried a bag filled with chisels, hammers and two gold coins. Several victims were found carrying house keys, as if fully expecting to return home once the volcanic eruption had passed. Though excavation work began in the 1980s, forensics experts more recently photographed the skeletons, made fiberglass duplicates in a lab in Turin and, in 2011, placed them in the identical positions as the original remains. Walkways allow the public to view the reproduced skeletons.

Today, with restoration virtually completed and new landscaping installed, tourists can walk along the sand just as residents of Herculaneum would have done. They can also relive to a remarkable degree the experience of Roman visitors who arrived by sea. “If you were here 2,000 years ago, you would approach by boat and pull up on a beach,” says conservator Farella, leading me along a ramp past the arches opening to the skeletons. In front of us, a steep set of stairs breaches the outer walls of Herculaneum and takes us into the heart of the Roman city. Farella leads me past a bath complex and gymnasium—“to smarten yourself up before you come into town”—and a sacred area where departing travelers sought protection before venturing back to sea. Farther along stands the Villa of the Papyri, believed to be the home of Julius Caesar’s father-in-law. (The villa housed the scrolls now being deciphered by researchers.) It is closed to the public, but plans are underway for a renovation, a project that Farella says “is the next great challenge” at Herculaneum.

He leads me into the Suburban Baths, a series of interconnected chambers filled with huge marble tubs, carved stone benches, tiled floors, frescoes and friezes of Roman soldiers, and a furnace and pipe system that heated the water. Solidified lava, frozen for 2,000 years, pushes up against the doors and windows of the complex. “The bath building

Immediately after the destruction of Herculaneum and Pompeii, the extent of the devastation stunned survivors—the roughly 19-hour eruption had killed thousands in the obliterated cities and laid waste to a 115-square-mile area.

was filled with pyroclastic material; excavators chipped it all away,” the conservator says. We pass through the colonnaded entryway of a steam room, down steps leading into a perfectly preserved bathtub. Thick marble walls have sealed in moisture, replicating the atmosphere that Roman bathers experienced. Yet, as if to underscore the reality that even Herculaneum has its troubles, I’m told that parts of this ghostly former center of Roman social life have opened to the public only intermittently, and it is closed now. There’s simply not enough staff to guard it.

In Pompeii, another eight stops along the Circumvesuviana Line, the train that carries thousands of visitors to the site every day, past graffiti-covered stations and scruffy exurbs, the staff is eager to present an impression of new dynamism. In 2012 the European Union gave the go-ahead for its own version of a Herculaneum-style initiative: the Great Pompeii Project, a €105 million (\$117.8 million) fund intended to rescue the site.

Mattia Buondonno, Pompeii’s chief guide, a 40-year veteran who has escorted notables including Bill Clinton, Meryl Streep, Roman Polanski and Robert Harris (who was researching his best-selling thriller *Pompeii*), pushes through a tourist horde at the main entrance gate and leads me across the Forum, the marvelously preserved administrative and commercial center of the city.

I wander through one of the most glorious of Pompeii’s villas, the House of the Golden Cupids, a wealthy man’s residence, its interior embellished with frescoes and mosaics, built around a garden faithfully reproduced on the basis of period paintings. Fully restored with funding from the Italian government and the EU, the house was to open the week after my visit,



after being closed for several years. “We needed money from the EU, and we needed architects and engineers. We could not realize this by ourselves,” says Grete Stefani, Pompeii’s archaeological director.

I also paid a visit to the Villa dei Misteri, which was undergoing an ambitious renovation. After decades of ill-conceived cleaning attempts—



agents that were used included waxes and gasoline—the villa’s murals, depicting scenes from Roman mythology and everyday life in Pompeii, had darkened and become indecipherable. Project director Stefano Vanacore surveyed the work-in-progress. In an 8-by-8-foot chamber covered with frescoes, two contractors wearing hard hats were dabbing the

paintings with outsize cotton swabs, dissolving wax. “This stuff has been building up for more than 50 years,” one of the workers told me.

In a large salon next door, others were using laser tools to melt away wax and gasoline buildup. Golden sparks shot off the bearded face of the Roman god Bacchus as the grime dissolved; beside him, a newly revealed

Pan played his flute, and gods and goddesses caroused and banqueted. “It’s beginning to look the way it did before the eruption,” Vanacore said.

A wall panel across the room presented a study in contrasts: The untouched half was shrouded in dust, with bleached-out red pigments and smudged faces; the other half dazzled with figures

CONTINUED ON PAGE 124



RETURN OF

Lee's *Maycomb*, indelibly evoked in the novel that sells a million copies annually, endures in the small-town reality of Monroeville.



THE MOCKINGBIRD

*Traveling back in time
to visit Harper Lee's hometown, the
setting of her 1960 masterpiece and
the controversial sequel due
within the month*

by **PAUL THEROUX**

photographs by **MARK PETERSON**

The twiggy branches of the redbuds were in bloom,

the shell-like magnolia petals had begun to twist open, the numerous flowering Bradford pear trees—more blossomy than cherries—were a froth of white, and yet this Sunday morning in March was unseasonably chilly in Monroeville, Alabama. A week before, I had arrived there on a country road. In the Deep South, and Alabama especially, all the back roads seem to lead into the bittersweet of the distant past.

Over on Golf Drive, once a white part of town, Nannie Ruth Williams had risen at 6 in the dim light of a late winter dawn to prepare lunch—to simmer the turnip greens, cook the yams and sweet potatoes, mix the mac and cheese, bake a dozen biscuits, braise the chicken parts and set them with vegetables in the slow cooker. Lunch was seven hours off, but Nannie Ruth's rule was "No cooking after church." The food had to be ready when she got home from the Sunday service with her husband, Homer Beecher Williams—"H.B." to his friends—and anyone else they invited. I hadn't met her, nor did she yet know that one of the diners that day would be me.

The sixth of 16 children, born on the W. J. Anderson plantation long ago, the daughter of sharecropper Charlie Madison (cotton, peanuts, sugar cane, hogs), Nannie Ruth had a big-family work ethic. She had heard that I was meeting H.B. that morning, but had no idea who I was, or why I was in Monroeville, yet in the Southern way, she was prepared to be welcoming to a stranger, with plenty of food, hosting a meal that was a form of peacemaking and fellowship.

Monroeville styles itself "the Literary Capital of Alabama." Though the town had once been segregated, with the usual suspicions and misunderstandings that arise from such forced separation, I found it to be a place of sunny streets and friendly people, and also—

helpful to a visiting writer—a repository of long memories. The town boasts that it has produced two celebrated writers, who grew up as neighbors and friends, Truman Capote and Harper Lee. Their homes no longer stand, but other landmarks persist, those of Maycomb, the fictional setting of *To Kill A Mockingbird*. Still one of the novels most frequently taught in American high schools, Lee's creation has sold more than 40 million copies and been translated into 40 languages.

Among the pamphlets and souvenirs sold at the grandly domed Old Courthouse Museum is *Monroeville, The Search for Harper Lee's Maycomb*, an illustrated booklet that includes local history as well as images of the topog-

raphy and architecture of the town that correspond to certain details in the novel. Harper Lee's work, published when she was 34, is a mélange of personal reminiscence, fictional flourishes and verifiable events. The book contains two contrasting plots, one a children's story, the tomboy Scout, her older brother Jem and their friend Dill, disturbed in their larks and pranks by an obscure house-bound neighbor, Boo Radley; and in the more portentous story line, Scout's father's combative involvement in the defense of Tom Robinson, the decent black man, who has been accused of rape.

What I remembered of my long-ago reading of the novel was the gusto of the children and their outdoor world,

Welcome to

Lee's personal history and her literary legacy live on in the town she immortalized



Monroeville jailhouse, c. 1930



Harper and A.C. Lee, 1961



Scout subdues a bully



Monroeville's Old Courthouse



Atticus, Scout and Jem at home



Reclusive Boo Radley's house

and the indoor narrative, the courtroom drama of a trumped-up charge of rape, a hideous miscarriage of justice and a racial murder. Rereading the novel recently, I realized I had forgotten how odd the book is, the wobbly construction, the arch language and shifting point of view, how atonal and forced it is at times, a youthful directness and clarity in some of the writing mingled with adult perceptions and arcane language. For example, Scout is in a classroom with a new teacher from North Alabama. "The class murmured apprehensively," Scout tells us, "should she prove to harbor her share of the peculiarities indigenous to that region." This is a tangled way for a 6-year-old to perceive a stranger,

and this verbosity pervades the book.

I am now inclined to Flannery O'Connor's view of it as "a child's book," but she meant it dismissively, while I tend to think that its appeal to youngsters (like that of *Treasure Island* and *Tom Sawyer*) may be its strength. A young reader easily identifies with the boisterous Scout and sees Atticus as the embodiment of paternal virtue. In spite of the lapses in narration, the book's basic simplicity and moral certainties are perhaps the reason it has endured for more than 50 years as the tale of an injustice in a small Southern town. That it appeared, like a revelation, at the very moment the civil rights movement was becoming news for a nation wishing to understand, was also part of its success.

Monroeville had known a similar event, the 1934 trial of a black man, Walter Lett, accused of raping a white woman. The case was shaky, the woman unreliable, no hard evidence; yet Walter Lett was convicted and sentenced to death. Before he was electrocuted, calls for clemency proved successful; but by then Lett had been languishing on Death Row too long, within earshot of the screams of doomed men down the hall, and he was driven mad. He died in an Alabama hospital in 1937, when Harper Lee was old enough to be aware of it. Atticus Finch, an idealized version of A.C. Lee, Harper's attorney father, defends the wrongly accused Tom Robinson, who is a tidier version of Walter Lett.

Never mind the contradictions and

“You won’t find more than **four or five black people** in the audience. They’ve lived it.”

inconsistencies: Novels can hallow a place, cast a glow upon it and inspire bookish pilgrims—and there are always visitors, who’d read the book or seen the movie. Following the free guidebook *Walk Monroeville*, they stroll in the downtown historic district, admiring the Old Courthouse, the Old Jail, searching for Maycomb, the locations associated with the novel’s mythology, though they search in vain for locations of the movie, which was made in Hollywood. It is a testament to the spell cast by the novel, and perhaps to the popular film, that the monument at the center of town is not to a Monroeville citizen of great heart and noble achievement, nor a local hero or an iconic Confederate soldier, but to a fictional character, Atticus Finch.

These days the talk in town is of Harper Lee, known locally by her first name, Nelle (her grandmother’s name Ellen spelled backward). Avoiding publicity from the earliest years of her success, she is back in the news because of the discovery and disinterment of a novel she’d put aside almost six decades ago, an early version of the Atticus Finch-Tom Robinson story, told by Scout grown older and looking down the years. Suggesting the crisis of a vulnerable and convicted man in the Old Jail on North Mount Pleasant Avenue, the novel is titled *Go Set a Watchman*.

“It’s an old book!” Harper Lee told a mutual friend of ours who’d seen her while I was in Monroeville. “But if someone wants to read it, fine!”

Speculation is that the resurrected novel will be sought after as the basis of a new film. The 1962 adaptation of *To Kill A Mockingbird*, with Gregory

Peck’s Oscar-winning performance as Atticus Finch, sent many readers to the novel. The American Film Institute has ranked Atticus as the greatest movie hero of all time (Indiana Jones is number two). Robert Duvall, who at age 30 played the mysterious neighbor, Boo Radley, in the film, recently said: “I am looking forward to reading the [new] book. The film was a pivotal point in my career and we all have been waiting for the second book.”

According to biographer Charles Shields, author of *Mockingbird: A Portrait of Harper Lee*, Nelle started several books after her success in 1960: a new novel, and a nonfiction account of a serial murderer. But she’d abandoned them, and apart from a sprinkling of scribbles, seemingly abandoned writing anything else—no stories, no substantial articles, no memoir of her years of serious collaboration with Truman Capote on *In Cold Blood*. Out of the limelight, she had lived well, mainly in New York City, with regular visits home, liberated by the financial windfall but burdened—maddened, some people said—by the pressure to produce another book. (Lee, who never married, returned to Alabama permanently in 2007 after suffering a stroke. Her sister Alice, an attorney in Monroeville who long handled Lee’s legal affairs, died this past November at age 103.)

It seems—especially to a graphomaniac like myself—that Harper Lee was perhaps an accidental novelist—one book and done. Instead of a career of creation, a refinement of this profession of letters, an author’s satisfying dialogue with the world, she shut up shop in a retreat from the writing life,



Nannie Ruth Williams, who attends one of the town’s many churches—about two dozen—prepares Sunday lunch. “I always make extra,” she says. “No telling how many people will be here.”

like a lottery winner in seclusion. Now 89, living in a care home at the edge of town, she is in delicate health, with macular degeneration and such a degree of deafness that she can communicate only by reading questions written in large print on note cards.

“What have you been doing?” my friend wrote on a card and held it up.

“What sort of fool question is that?” Nelle shouted from her chair. “I just sit here. I don’t do anything!”

She may be reclusive but she is anything but a shrinking violet, and she



has plenty of friends. Using a magnifier device, she is a reader, mainly of history, but also of crime novels. Like many people who vanish, wishing for privacy—J.D. Salinger is the best example—she has been stalked, intruded upon, pestered and sought after. I vowed not to disturb her.

Nannie Ruth Williams knew the famous book, and she was well aware of Monroeville's other celebrated author. Her grandfather had sharecropped on the Faulk family land, and it so happened that Lillie Mae Faulk had married Archulus Julius Persons in 1923 and given birth to Truman Streckfus Persons a little over a year later. After Lillie Mae married a man named Capote, her son changed

his name to Truman Capote. Capote had been known in town for his big-city airs. "A smart ass," a man who'd grown up with him told me. "No one liked him." Truman was bullied for being small and peevish, and his defender was Nelle Lee, his next-door neighbor. "Nelle protected him," that man said. "When kids would hop on Capote, Nelle would get 'em off. She popped out a lot of boys' teeth."

Capote, as a child, lives on as the character Dill in the novel. His portrayal is a sort of homage to his oddness and intelligence, as well as their youthful friendship. "Dill was a curiosity. He wore blue linen shorts that buttoned to his shirt, his hair was snow-white and stuck to his head like duck-fluff; he was a year my senior but I towered over him." And

it is Dill who animates the subplot, which is the mystery of Boo Radley.

Every year, a highly praised and lively dramatization of the novel is put on by the town's Mockingbird Players, with dramatic courtroom action in the Old Courthouse. But Nannie Ruth smiled when she was asked whether she'd ever seen it. "You won't find more than four or five black people in the audience," a local man told me later. "They've lived it. They've been there. They don't want to be taken there again. They want to deal with the real thing that's going on now."

H.B. Williams sighed when any mention of the book came up. He was born in a tenant farming family on the Blanchard Slaughter plantation where "Blanchie," a wealthy but child-

He laughed at the notion of a ***Mockingbird*-fed economy**. “No money in that, no sir.”

less white landowner, would baby-sit for the infant H.B. while his parents worked in the fields, picking and chopping cotton. This would have been at about the time of the Walter Lett trial, and the fictional crime of *Mockingbird*—mid-’30s, when the Great Depression gripped “the tired old town” of the novel, and the Ku Klux Klan was active, and the red clay of the main streets had yet to be paved over.

After the book was published and became a best seller, H.B., then a school principal, was offered the job of assistant principal, and when he refused, pointing out that it was a demotion, he was fired. He spent years fighting for his reinstatement. His grievance was not a sequence of dramatic events like the novel, it was just the unfairness of the Southern grind. The pettifoggery dragged on for ten years, but H.B. was eventually triumphant. Yet it was an injustice that no one wanted to hear about, unsensational, unrecorded, not at all cinematic.

In its way, H.B.’s exhausting search for justice resembles that of the public-interest attorney Bryan Stevenson in his quest to exonerate Walter McMillian, another citizen of Monroeville. This was also a local story, but a recent one. One Saturday morning in 1986, Ronda Morrison, a white 18-year-old clerk at Jackson Cleaners, was found shot to death at the back of the store. This was in the center of town, near the Old Courthouse made famous 26 years earlier in the novel about racial injustice. In this real case, a black man, Walter McMillian, who owned a local land-clearing business,



was arrested, though he’d been able to prove he was nowhere near Jackson Cleaners that day. The trial, moved to mostly white Baldwin County, lasted a day and a half. McMillian was found guilty and sentenced to death.

It emerged that McMillian had been set up; the men who testified against him had been pressured by the police, and later recanted. Bryan Stevenson—the founder of the Equal Justice Initiative in Montgomery, Alabama, who today is renowned for successfully arguing before the Supreme Court in 2012 that lifetime sentences for juveniles convicted of homicide constituted cruel and unusual punishment—had taken an interest in the case. He appealed the conviction, as he relates in his prize-winning account, *Just Mercy* (2014). After McMillian had been on death row for five years, his conviction was overturned; he was released in 1993. The wheels of justice grind slowly, with paper shuffling and appeals. Little drama, much persistence. In the town with a memorial to Atticus Finch, not Bryan Stevenson.

And that’s the odd thing about a great deal of a certain sort of Deep South fiction—its grotesquerie and gothic, its

high color and fantastication, the emphasis on freakishness. Look no further than Faulkner or Erskine Caldwell, but there’s plenty in Harper Lee too, in *Mockingbird*, the Boo Radley factor, the Misses Tutti and Frutti, and the racist Mrs. Dubose, who is a morphine addict: “Her face was the color of a dirty pillowcase and the corners of her mouth glistened with wet which inched like a glacier down the deep grooves enclosing her chin.” This sort of prose acts as a kind of indirection, dramatizing weirdness as a way of distracting the reader from day to day indignities.

Backward-looking, few Southern writers concern themselves with the new realities, the decayed downtown, the Piggly Wiggly and the pawn shops, the elephantine Walmart, reachable from the bypass road, where the fast-food joints have put most of the local eateries out of business (though AJ’s Family Restaurant, and the Court House Café in Monroeville remain lively). Monroeville people I met were proud of having overcome hard times. Men of a certain age recalled World War II: Charles Salter, who was 90, served in the 78th Infantry, fighting in Germany, and just as his division reached the west bank of the Rhine he was hit by shrapnel in the leg and foot. Seventy years later he still needed regular operations. “The Depression was hard,” he said. “It lasted here till long after the war.” H.B. Williams was drafted to fight in Korea. “And when I returned to town, having fought for my country, I found I couldn’t vote.”

Some reminiscences were of a lost world, like those of the local columnist, George Thomas Jones, who was 92 and remembered when all the roads of the town were red clay, and how as a drug-store soda jerk he was sassed by Truman Capote, who said, “I sure would like to have something good, but you ain’t got it. . . . A Broadway Flip.” Young George faced him down, saying, “Boy, I’ll flip you off that stool!” Charles Johnson, a popular barber in town, worked his scissors on my head and told me, “I’m from the child abuse era—hah! If I was bad my daddy would tell me to go out and

cut a switch from a bridal wreath bush and he'd whip my legs with it. Or a keen switch, more narrah. It done me good!"

Mr. Johnson told me about the settlement near the areas known as Franklin and Wainwright, called Scratch Ankle, famous for inbreeding. The poor blacks lived in Clausell and on Marengo Street, the rich whites in Canterbury, and the squatters up at Limestone were to be avoided. But I visited Limestone just the same; the place was thick with idlers and drunks and barefoot children, and a big toothless man named LaVert stuck his finger in my face and said, "You best go away, mister—this is a bad neighborhood." There is a haunted substratum of darkness in Southern life, and though it pulses through many interactions, it takes a long while to perceive it, and even longer to understand.

The other ignored aspect of life: the Deep South still goes to church, and dresses up to do so. There are good-

sized churches in Monroeville, most of them full on Sundays, and they are sources of inspiration, goodwill, guidance, friendship, comfort, outreach and snacks. Nannie Ruth and H.B. were Mount Nebo Baptists, but today they'd be attending the Hopewell C.M.E. Church because the usual pianist had to be elsewhere, and Nannie Ruth would play the piano. The pastor, the Rev. Eddie Marzett, had indicated what hymns to plan for. It was "Women's Day." The theme of the service was "Women of God in these Changing Times," with appropriate Bible readings and two women preachers, the Rev. Marzett taking a back pew in his stylish white suit and tinted glasses.

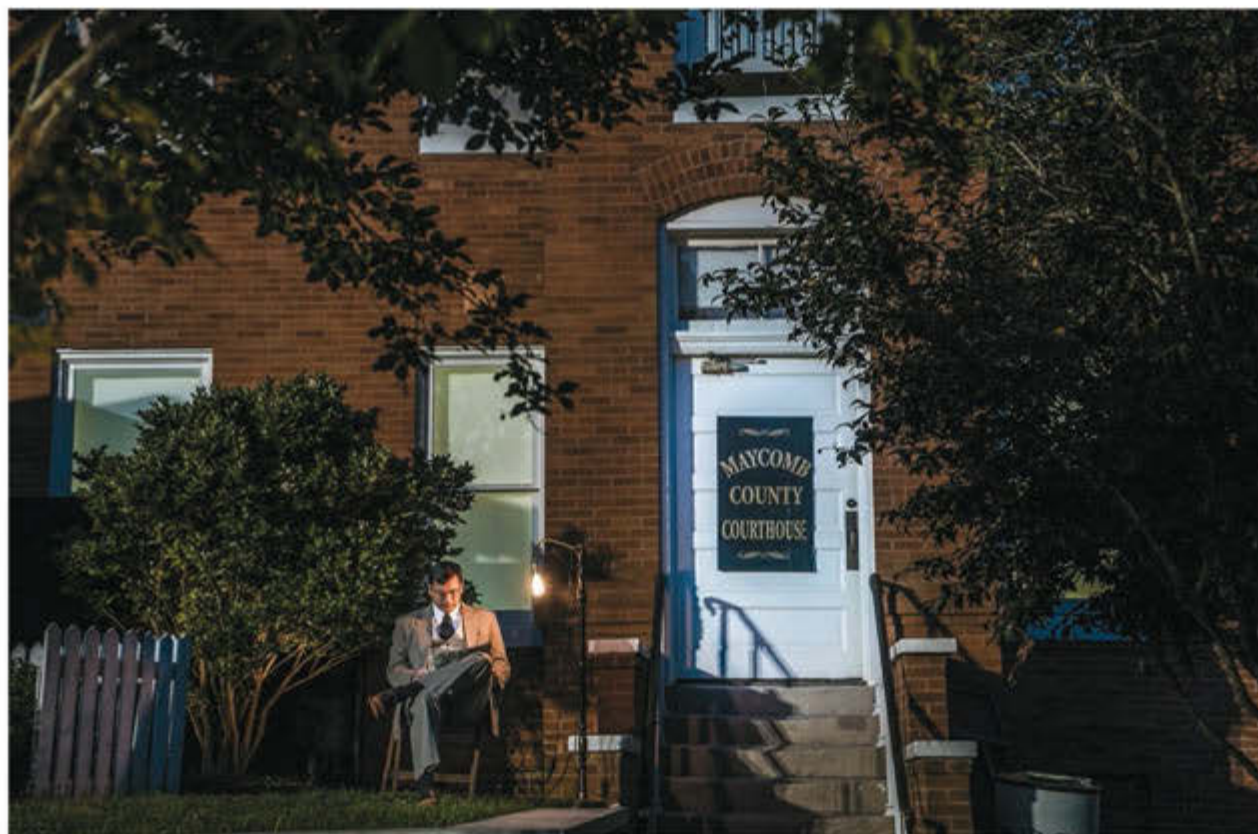
Monroeville is like many towns of its size in Alabama—indeed the Deep South: a town square of decaying elegance, most of the downtown shops and businesses closed or faltering, the main industries shut down. I was to discover that *To Kill A Mockingbird* is a minor aspect of Monroeville, a place of hospitable and hard-working people, but a

dying town, with a population of 6,300 (and declining), undercut by NAFTA, overlooked by Washington, dumped by manufacturers like Vanity Fair Mills (employing at its peak 2,500 people, many of them women) and Georgia Pacific, which shut down its plywood plant when demand for lumber declined. The usual Deep South challenges in education and housing apply here, and almost a third of Monroe County (29 percent) lives in poverty.

"I was a traveling bra and panty salesman," Sam Williams told me. "You don't see many of those nowadays." He had worked for Vanity Fair for 28 years, and was now a potter, hand-firing cups and saucers of his own design. But he had lucked out in another way: Oil had been found near his land—one of Alabama's surprises—and his family gets a regular small check, divided five ways among the siblings, from oil wells on the property. His parting shot to me was an earnest plea: "This is a wonderful town. Talk nice about Monroeville."

Willie Hill had worked for Vanity Fair for 34 years and was now unem-

The Old County Courthouse, a museum housing Lee and Capote memorabilia, preserves the scene of the trial (Gregory Peck as Atticus Finch, opposite).





ployed. “They shut down here, looking for cheap labor in Mexico.” He laughed at the notion that the economy would improve because of the *Mockingbird* pilgrims. “No money in that, no sir. We need industry, we need real jobs.”

“I’ve lived here all my life—81 years,” a man pumping gas next to me said out of the blue, “and I’ve never known it so bad. If the paper mill closes, we’ll be in real trouble.” (Georgia-Pacific still operates three mills in or near Monroeville.) Willie Hill’s nephew Derek was laid off in 2008 after eight years fabricating Georgia-Pacific plywood. He made regular visits to Monroeville’s picturesque and well-stocked library (once the LaSalle Hotel: Gregory Peck had slept there in 1962 when he visited to get a feel for the town), looking for jobs on the library’s computers and updating his résumé. He was helped by the able librarian, Bunny Hines No-

bles, whose family had once owned the land where the hotel stands.

Selma is an easy two-hour drive up a country road from Monroeville. I had longed to see it because I wanted to put a face to the name of the town that had become a battle cry. It was a surprise to me—not a pleasant one, more of a shock, and a sadness. The Edmund Pettus Bridge I recognized from newspaper photos and the footage of Bloody Sunday—protesters being beaten, mounted policemen trampling marchers. That was the headline and the history. What I was not prepared for was the sorry condition of Selma, the shut-down businesses and empty once-elegant apartment houses near the bridge, the whole town visibly on the wane, and apart from its mall, in desperate shape, seemingly out of work. This decrepitude was not a headline.

Just a week before, on the 50th anniversary of the march, President Obama, the first lady, a number of celebrities,

civil rights leaders, unsung heroes of Selma and crowds of the limelight had observed the anniversary. They invoked the events of Bloody Sunday, the rigors of the march to Montgomery, and the victory, the passage of the Voting Rights Act of 1965.

But all that was mostly commemorative fanfare, political theater and sentimental rage. The reality, which was also an insult, was that these days in this city which had been on the front line of the voting rights movement, voting turnout among the 18-to-25 age group was discouragingly low, with the figures even more dismal in local elections. I learned this at the Interpretive Center outside town, where the docents who told me this shook their heads at the sorry fact. After all the bloodshed and sacrifice, voter turnout was lagging, and Selma itself was enduring an economy in crisis. This went unremarked by the president and the civil rights stalwarts and the celebrities, most of whom took the next plane out of this sad and supine town.



See more of Mark Peterson’s
Monroeville portfolio at
Smithsonian.com/alabama

Driving out of Selma on narrow Highway 41, which was lined by tall trees and deep woods, I got a taste of the visitable past. You don't need to be a literary pilgrim; this illuminating experience of country roads is reason enough to drive through the Deep South, especially here, where the red clay lanes—brightened and brick-hued from the morning rain—branch from the highway into the pines; crossing Mush Creek and Cedar Creek, the tiny flyspeck settlements of wooden shotgun shacks and old house trailers and the white-planked churches; past the roadside clusters of foot-high ant hills, the gray witch-hair lichens trailing from the bony limbs of dead trees, a mostly straight-ahead road of flat fields and boggy pinewoods and flowering shrubs, and just ahead a pair of crows hopping over a lump of crimson road-kill hash.

I passed through Camden, a ruinous town of empty shops and obvious poverty, just a flicker of beauty in some of

the derelict houses, an abandoned filling station, the white-washed clapboards and a tiny cupola of old Antioch Baptist Church (Martin Luther King Jr. had spoken here in April 1965, inspiring a protest march that day and the next), the imposing Camden public library, its facade of fat white columns; and then the villages of Beatrice—Bee-ah-triss—and Tunnel Springs. After all this time-warp decay, Monroeville looked smart and promising, with its many churches and picturesque courthouse and fine old houses. Its certain distinction and self-awareness and its pride were the result of its isolation. Nearly 100 miles from any city, Monroeville had always been in the middle of nowhere—no one arrived by accident. As Southerners said, You had to be going there to get there.

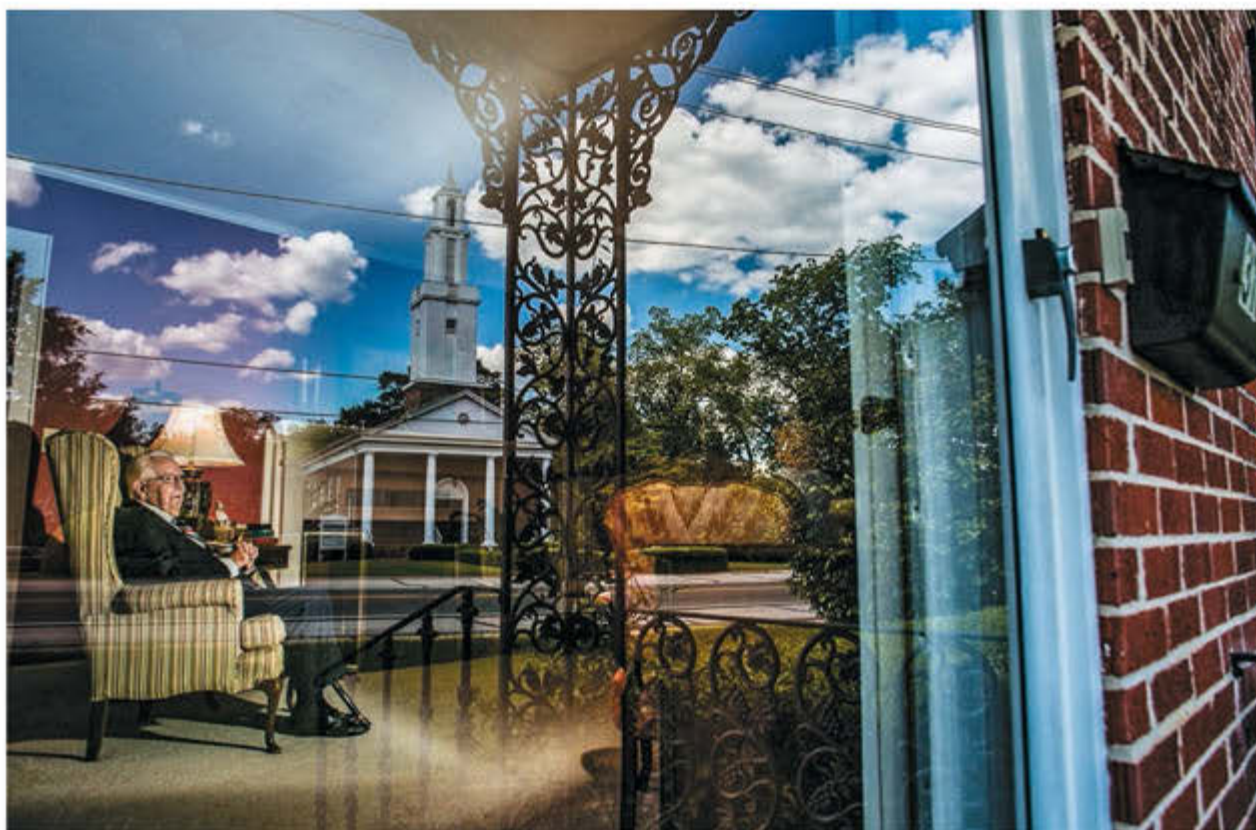
Hopewell C.M.E. Church—in a festive Women's Day mood—was adjacent to the traditionally black part of town, Clausell. The church's sanctuary had served as a secret meeting place in the 1950s for the local civil rights movement, many of the meetings presided over by the pastor, R.V. McIntosh, and a firebrand named

Ezra Cunningham, who had taken part in the Selma march. All this information came from H.B. Williams, who had brought me to a Hopewell pew.

After the hymns (Nannie Ruth Williams on the piano, a young man on drums), the announcements, the two offerings, the readings from Proverbs 31 ("Who can find a virtuous woman, for her price is far above rubies"), and prayers, Minister Mary Johnson gripped the lectern and shouted: "Women of God in these Changing Times, is our theme today, praise the Lord," and the congregation called out "Tell it, sister!" and "Praise his name!"

Minister Mary was funny and teasing in her sermon, and her message was simple: Be hopeful in hard times. "Don't look in the mirror and think, 'Lord Jesus, what they gonna think 'bout my wig?' Say 'I'm coming as I am!' Don't matter 'bout your dress—magnify the Lord!" She raised her arms and in her final peroration said, "Hopelessness is a bad place to be. The Lord gonna fee-all you with hope. You might not have money—never mind. You need the Holy Spirit!"

H.B. Williams (left) and Rev. Thomas Lane Butts (below, at home) were civil rights activists. "We have known each other in good times and bad," says Butts.



“We had no land, **we had nothing**.... We took in racism with our mother’s milk.”

Afterward, the hospitable gesture, my invitation to lunch at the Williams house, a comfortable bungalow on Golf Drive, near the gates to Whitey Lee Park, which was off-limits to blacks until the 1980s, and the once-segregated golf course. We were joined at the table by Arthur Penn, an insurance man and vice president of the local NAACP branch, and his son Arthur Penn Jr.

I raised the subject of *Mockingbird*, which made Nannie Ruth shrug. Arthur Senior said, “It’s a distraction. It’s like saying, ‘This is all we have. Forget the rest.’ It’s like a 400-pound comedian on stage telling fat jokes. The audience is paying more attention to the jokes than to what they see.”

In Monroeville, the dramas were intense but small-scale and persistent. The year the book came out all the schools were segregated and they remained so for the next five years. And once the schools were integrated in 1965, the white private school Monroe Academy was established not long after. Race relations had been generally good, and apart from the Freedom Riders from the North (which Nelle Lee disparaged at the time as agitators), there were no major racial incidents, only the threat of them.

“Most whites thought, ‘You’re good in your place. Stay there and you’re a good nigger,’” H.B. said. “Of course it was an inferior situation, a double standard all over.”

And eating slowly he was provoked to a reminiscence, recalling how in December 1959 the Monroeville Christmas parade was canceled, because the Klan had warned that if the band from the black

high school marched with whites, there would be blood. To be fair, all the whites I spoke to in Monroeville condemned this lamentable episode. Later, in 1965, the Klan congregated on Drewry Road, wearing sheets and hoods, 40 or 50 of them, and they marched down Drewry to the Old Courthouse. “Right past my house,” H.B. said. “My children stood on the porch and called out to them.” This painful memory was another reason he had no interest in the novel, then in its fifth year of bestsellerdom.

“This was a white area. Maids could walk the streets, but if the residents saw a black man they’d call the sheriff, and then take you to jail,” Arthur Penn said.

And what a sheriff. Up to the late 1950s, it was Sheriff Charlie Sizemore, noted for his bad temper. How bad? “He’d slap you upside the head, cuss you out, beat you.”

One example: A prominent black pastor, N.H. Smith, was talking to another black man, Scott Nettles, on the corner of Claiborne and Mount Pleasant, the center of Monroeville, and steps from the stately courthouse, just chatting. “Sizemore comes up and slaps the cigarette out of Nettles’ mouth and cusses him out, and why? To please the white folks, to build a reputation.”

That happened in 1948, in this town of long memories.

H.B. and Arthur gave me other examples, all exercises in degradation, but here is a harmonious postscript to it all. In the early ’60s, Sizemore—a Creek Indian, great-grandson to William Weatherford, Chief Red Eagle—became crippled and had a conversion. As an act of atonement, Sizemore went down to



Franky D’s is a regular gathering place. Says one resident: “There’s segregation in barber shops, most churches, the funeral homes. It’s just the way things are.”

Clausell, to the main house of worship, Bethel Baptist Church, and begged the black congregation for forgiveness.

Out of curiosity, and against the advice of several whites I met in town, I visited Clausell, the traditionally black section of town. When Nelle Lee was a child, the woman who bathed and fed her was Hattie Belle Clausell, the so-called mammy in the Lee household, who walked from this settlement several miles every day to the house on South Alabama Avenue in the white part of town (the Lee house is now gone, replaced by Mel’s Dairy Dream and a defunct swim-



ming pool-supply store). Clausell was named for that black family.

I stopped at Franky D's Barber and Style Shop on Clausell Road, because barbers know everything. There I was told that I could find Irma, Nelle's former housekeeper, up the road, "in the projects."

The projects was a cul-de-sac of brick bungalows, low-cost housing, but Irma was not in any of them.

"They call this the 'hood," Brittany Bonner told me—she was on her porch, watching the rain come down. "People warn you about this place, but it's not so bad. Sometimes we hear guns—people shooting in the woods. You see that cross down the road? That's for the man they call 'James T'—James Tunstall. He was shot and killed a few years

ago right there, maybe drug-related."

A white man in Monroeville told me that Clausell was so dangerous that the police never went there alone, but always in twos. Yet Brittany, 22, mother of two small girls, said that violence was not the problem. She repeated the town's lament: "We have no work, there are no jobs."

Brittany's great-aunt Jacqueline Packer thought I might find Irma out at Pineview Heights, down Clausell Road, but all I found were a scattering of houses, some bungalows and many dogtrot houses, and rotting cars, and a sign on a closed roadside café, "Southern Favorites—Neckbones and Rice, Turkey Necks and Rice," and then the pavement ended and the road was red clay, velvety in the rain, leading into the pinewoods.

Back in town I saw a billboard with a stern message: "Nothing in this country is free. If you're getting something without paying for it, Thank a Taxpayer." Toward the end of my stay in Monroeville, I met the Rev. Thomas Lane Butts, former pastor of the First United Methodist Church, where Nelle Lee and her sister, Alice, had been members of his congregation, and his dear friends.

"This town is no different from any other," he told me. He was 85, and had traveled throughout the South, and knew what he was talking about. Born ten miles east in what he called "a little two-mule community" of Bermuda (Ber-moo-dah in the local pronunciation), his father had been a tenant farmer—corn, cotton, vegetables. "We had

CONTINUED ON PAGE 126



THE MAD KING & MAGNIA CARTA

ILLUSTRATION BY **Teagan White**

HOW DID A PEACE TREATY SIGNED—AND BROKEN—800 YEARS AGO BECOME ONE OF THE WORLD'S MOST INFLUENTIAL DOCUMENTS?

BY **Dan Jones**



E PARKED NEAR A MEADOW, TRAMPED THROUGH

a damp cow field and stood in the shadow of one of Britain's oldest living things. The Ankerwycke Yew is 2,000 years old: a gnarled beast of a tree with a trunk ten feet wide and thick branches spilling out fronds of spiny, dark-green needles. Romantic legend holds that Henry VIII courted Anne Boleyn beneath its boughs. It grows on the north bank of the Thames upstream from London, in the county of Surrey. Nearby are the ruins of a 12th-century priory, a couple of large water reservoirs and Heathrow Airport. Every 90 seconds a plane roars overhead. In the distance we could hear traffic on the M25, the motorway that encircles London, but across the river it was calm. Over there was Runnymede, a low-lying, lush green meadow cut through and watered by the Thames. The ground is soft and muddy; stand too long and your boots will start to sink. The foot traffic that morning consisted mostly of dog walkers. There was little to indicate that we were near the spot where, 800 years ago, **King John** agreed to a peace treaty with his rebellious barons. Today we call that agreement Magna Carta.

If we had stood beside the younger, smaller Ankerwycke Yew on Monday, June 15, 1215, we would have witnessed a busier and more dangerous Runnymede. The treaty was struck on the brink of civil war. The conference that produced it was tense. Dozens of earls, barons and bishops attended, all with



their own military followings. The chronicler Ralph of Coggeshall wrote that these rebels “gathered with a multitude of most famous knights, armed well at all points.” They camped in tents on one side of the meadow. On the other side stood large royal pavilions, which would have soared into the air with John’s standards depicting three lions embroidered in gold fluttering above. When the king came down to the conference he traveled, probably by barge, from his fiercely defended castle upriver at Windsor. He didn’t want to come. It was said by another chronicler that although he may have been charming during negotiations, behind the scenes “he gnashed his teeth, rolled his eyes, grabbed sticks and straws and gnawed them like a madman.” The tantrums did him no good. Although John did not know it at the time, when he agreed to put his seal to Magna Carta, he was both limiting forever the rights of kings to place themselves above the law and creating the most famous constitutional document in the English-speaking world.

The world had written laws long before King John and Magna Carta. The commandments handed down by God to Moses, the Roman Code of Justinian and the Salic law of Germanic France had all laid out basic rules for human society, and they were kept in written form for reference in the case of dispute. Stone tablets survive from Mesopotamia bearing laws written in Sumerian around 2100 B.C. Magna Carta, which comprises 63 clauses spelling out in dense legalese some of the basic laws of medieval England,



ROOTS OF A REVOLUTION
John, the son of King Henry II (top), was known as “a tyrannous whelp.” As king, he abused his barons and feuded with Pope Innocent III (middle). With the nobility ready to rebel, Archbishop Stephen Langton (bottom) mediated the historic negotiations held at Runnymede (opposite).

established by Henry II had lands stretching from the borders of Scotland to the Pyrenees, John as a prince had no territories to call his own. He was nicknamed John Lackland. He was called plenty of other names, too. The chronicler Gerald of Wales condemned him as a “tyrannous whelp.” William of Newburgh said he was “nature’s enemy.” The French poet Bertrand de Born judged that “no man may ever trust him, for his heart is soft and cowardly.” From a very early age John was recognized as sly, conniving, deceitful and unscrupulous.

Still, bad character was no imped-

and which is often thought of as England’s first statute, fits into this tradition.

Yet England in the 13th century was in no sense lawless. If anything, it was one of the most deeply governed places on earth. From at least the time of Alfred the Great (A.D. 871-899) and most likely long before, English law had been codified, written down and pretty efficiently enforced. When the Normans invaded England in 1066, they continued to issue written legal codes, often when a new king was crowned. John’s father, Henry II (1133-1189), had been a particularly enthusiastic legal reformer. He created swaths of new legal processes and is often described as the father of English common law, that body of custom and precedent that complements statutory law. So the point of Magna Carta in 1215 was not to invent laws to fill the vacuum of anarchy. Rather, it was to restrain a king who was using his legal powers rather too keenly.

John was born in 1167. He was his father’s youngest son, and although the Plantagenet dynasty established by Henry II had lands stretching from the borders of Scotland to the Pyrenees, John as a prince had no territories to call his own. He was nicknamed John Lackland. He was called plenty of other names, too. The chronicler Gerald of Wales condemned him as a “tyrannous whelp.” William of Newburgh said he was “nature’s enemy.” The French poet Bertrand de Born judged that “no man may ever trust him, for his heart is soft and cowardly.” From a very early age John was recognized as sly, conniving, deceitful and unscrupulous.



iment to being king. John inherited the throne in 1199, after his heroic and much-admired elder brother Richard I, “the Lionheart,” died of gangrene after he was shot with a crossbow bolt during a siege. Almost immediately things went wrong. The Plantagenet empire included or controlled the French territories of Normandy, Brittany, Anjou, Maine, Touraine and Aquitaine—about a third of the territorial mass of modern France and virtually the entire western seaboard. During the first five years of John’s reign the bulk of this was lost, in large part thanks to his insipid military command. The most traumatic loss



was that of Normandy, conquered by the French in 1204. This was a terrible humiliation, and it had two important consequences. First, John was now forced to spend almost his entire reign in England (his father and brother had spent most of their reigns abroad), where his disagreeable personality brought him into regular conflict with his barons. Second, John's determination to reconquer Normandy and the rest of his lost French lands drove him to an extortionate form of government. He devoted himself to squeezing as much money as humanly possible out of his subjects, particularly his barons and the Church.

John was a legal whiz. He knew the machinery of government inside-out and the best ways to manipulate it to take his subjects' money. He would entangle his barons in massive debts to the crown and then use the courts to strip their wealth, often ruining them forever. As king he was entitled to charge his nobles fees known as "fines" for inheriting lands and titles and getting married. There was an understanding that these would be levied at reasonable rates, but John ignored it and charged some mind-blowing sums. In 1214 he charged one man £13,333—something like \$17 million or more today—for permission to marry. John also set the mili-

tary tax known as "scutage," by which a knight could buy his way out of military service to the crown, at an exorbitant rate. And he charged huge fees for his subjects to obtain justice in his courts.

Besides this racketeering, John also earned a reputation as vindictive and even murderous. It was believed that in 1203 he killed his nephew and rival, Arthur of Brittany. One chronicler heard that John had done the deed himself, "after dinner, when he was drunk and possessed by the devil," and thrown the body into the Seine. In 1208 John fell out with a close associate named William de Braose and pursued his family to destruction, starving to death

William's wife and eldest son in the dungeons of his castle. (William died in exile in France.) John mistreated hostages given to him as security for agreements: The knight William Marshal said he "kept his prisoners in such a horrible manner and in such abject confinement that it seemed an indignity and a disgrace to all those with him." And it was rumored that he made lecherous advances on his barons' wives and daughters.

Then there was the Church. In 1207 John fell out with Pope Innocent III over the appointment of a new archbishop of Canterbury. The king claimed the right to approve the appointment; so did the pope. A bitter standoff ensued. Innocent first placed England under interdict—a sentence banning all church services. Later he personally excommunicated John. It took six years to resolve this power struggle, during which time John seized Church lands and property and confiscated the vast revenues of his bishops, most of whom fled the country. This made John rich but earned him the lasting hatred of almost everyone connected with the Church. Fatally for his reputation, that included the monastic chroniclers who would write most of the contemporary histories of the reign. A typical judgment was given by the 13th-century writer Matthew Paris, in an epitaph for the king: "Foul as it is, hell itself is defiled by the fouler presence of John."

In 1213 Pope Innocent, tired of being ignored, asked the king of France to invade England and depose the faithless king. Finally, John backed down and reconciled with Rome. Later he even promised (probably in bad faith) to lead a new crusade to Jerusalem. But his abrasive methods had earned him the undying hatred of a

large group of English barons, particularly in the north of the realm. In 1214 they had their chance to strike. John gambled all of his ill-gotten wealth on a military campaign to win back Normandy. It failed spectacularly when his allies were crushed by the French at the Battle of Bouvines on July 27, 1214. "And thereafter began the war,



LAWS WITH TEETH
British Library exhibits commemorating Magna Carta include rare copies of the document—and two of King John's molars. They were collected when his tomb at Worcester Cathedral was opened for an antiquarian study in 1797, almost 600 years after he had been laid to rest.

the strife and criminal conflict between the King and the barons," wrote a contemporary historian. John returned home that autumn to find rebellion brewing. Insurgents were demanding that the king produce a charter promising to mend his ways, to stop abusing Church and aristocracy, and to govern in accordance with his own law, which they should help make. If he failed to do so, they would depose him and invite a new king to take his place.

These rebels, calling themselves the Army of God, finally took up arms in the spring of 1215 and seized control of London. This is what forced John to assent to Magna Carta at Runnymede that June. The agreement followed lengthy discussions mediated by the archbishop of Canterbury, Stephen Langton. When it was written down it came to about 4,000 words, now conventionally divided into 63 clauses. They covered a wide range of issues. The king conceded that the English church would be free from government interference, as would the City of London. He promised to cap military taxes and the fines he levied on his barons for inheritance and marriage.

He dealt with scores of other issues, large and small. John promised to eject foreign mercenaries from England, and he promised to remove the fish traps that obstructed rivers near London and blighted water transport. Most important of all, in Clauses 39 and 40

he promised that "no free man is to be arrested or imprisoned or stripped of his possessions or outlawed or exiled or in any other way ruined, nor will we go or send against him except by the legal judgment of his peers or by the law of the land. To no one will we sell, to no one will we deny or delay right or justice."

News of this extraordinary charter traveled fast. A Scottish chronicle from the time records that "A strange new order began in England; Whoever heard of such a thing? For the body longed to govern the head, And the people wished to rule the king." The charter itself was widely distributed, too. Royal scribes made at least 13 copies, and perhaps as many as 40. Each was authenticated with the king's royal seal. (He never signed Magna Carta.) They were then distributed around England, probably via the bishops, who stored them in their cathedrals. Today, only four survive.

One morning in early February this year I took a taxi to the British Library in London to meet the curator of medieval manuscripts, Claire Breay. Even though it was around seven o'clock, there was an air of excitement in the library's Treasures Gallery. TV crews were set up, ready for live broadcasts. We were there to witness a unique event. The four surviving copies of King John's Magna Carta were going on display together. It was the first time in 800 years that the four pieces of parchment had been in the same room.

The next day 1,215 people, selected by lottery, came to the library to see them. Later in the week the charters were taken to the Houses of Parliament. Then they were returned to their permanent homes: Two are kept in the British Library, one is owned by Lincoln Cathedral and displayed at the nearby castle, and one belongs to Salisbury Cathedral. (That's why Jay-Z made a private pilgrimage to Salisbury Cathedral to mark the U.K. launch of his 2013 album, *Magna Carta . . . Holy Grail*. The British Library turned him down.)

Viewed next to one another, it was surprising how different the charters were. There is no "original" Magna

Carta: The surviving charters from 1215 are “engrossments,” or written records of an oral agreement. Their text is virtually identical—heavily abridged Latin written in ink made from oak galls on parchment of dried, bleached sheepskin. Each charter is a different size and shape—one almost square, two “portrait” and one “landscape.” The Salisbury charter is written in dark ink and a sort of handwriting more typically seen in 13th-century Bibles and psalters than on legal documents. The other three are in a paler “chancery hand,” the script used on official documents by the king’s full-time scribes.

One of the British Library copies still retains its seal, although what was once a fine piece of red wax impressed on both sides with images of the king triumphant was melted in a library fire in 1731 and is now a shapeless brown blob. The charter to which it is attached is also in rotten condition. A ham-fisted attempt in the 1830s to preserve it had the opposite effect: The parchment has been flattened, half-dissolved and glued to a thick backing board. Most of the ink has been washed off and can be seen only using multispectral imaging techniques.

I found the sight of all these charters together thrilling, and I was not alone. At a reception for VIPs that evening, the queue of professors, bishops and politicians snaked out of the gallery and through the library’s main atrium. On a video screen dignitaries from around the world paid homage to the charter; they included Aung San Suu Kyi; the former British secretary of state, William Hague; and the U.S. Supreme Court justice Stephen Breyer. The next day, when the 1,215 public ballot winners came to see the charters, a young couple outside the library told me they had found the experience at the exhibition “deeply moving.”

In a sense it is a miracle that Magna Carta survives at all. As soon as he had granted the charter at Runnymede, John wrote to the pope and had it annulled. The civil war that the charter was intended to halt therefore began. During the course of it John died of dysentery. The noblemen governing

MAGNA CITED

Match each of the following Magna Carta-related quotations with its source

QUOTE

- 1 “It was born with a grey beard.”
- 2 “He signed away the right of Kings to take your teeth and eyes.”
- 3 “[L]et their business be to frame a CONTINENTAL CHARTER, or Charter of the United Colonies; (answering to what is called the Magna Carta of England).”
- 4 “It is contrary to our form of government, which asserts as did the English in the Magna Carta and the Petition of Right, that even the sovereign is subject to God and the law.”
- 5 “King John was not a good man, and no good friends had he. He stayed in every afternoon, but no-one came for tea.”
- 6 “The democratic aspiration is no mere recent phase in human history.... It was written in Magna Carta.”
- 7 “In place of the pompous catalogue of the ‘inalienable rights of man’ comes the modest Magna Carta of a legally limited working day.”
- 8 “Let the engine of the Magna Carta beat against the Jericho walls of slavery.”
- 9 “Let’s crowd-source a Magna Carta for the web.”
- 10 “The Magna Carta—was it a document signed at Runnymede in 1215 by King John pledging independence to the English barons, or was it a piece of chewing gum on a bedspread in Dorset? The latter idea is the brainchild of a man new to the field of historical research.”

SOURCE

- A Maxwell Anderson
- B Tim Berners-Lee
- C A.A. Milne
- D Frederick Douglass
- E Thomas Paine
- F U.S. District Judge Susan Webber Wright
- G Karl Marx
- H Franklin Delano Roosevelt
- I Samuel Johnson
- J Monty Python



ANSWERS: 1-Samuel Johnson on the veneration of Magna Carta 2-A Maxwell Anderson, lyrics to “The Ballad of Magna Carta,” 1940 3-E Thomas Paine, in *Common Sense*, 1776 4-F U.S. District Judge Susan Webber Wright, rejecting President Bill Clinton’s argument that he had immunity from Paula Jones’ sexual harassment lawsuit, 1994 5-C A.A. Milne, *Now We Are Six*, 1927 6-H Franklin Delano Roosevelt, inaugural address, 1941 7-G Karl Marx, on Britain’s Ten Hours Act, 1848 8-D Frederick Douglass, 1854 9-B Tim Berners-Lee, 2014 10-J Monty Python, “The Silliest Interview We’ve Ever Had,” 1972



England on behalf of his young son, Henry III, reissued the charter in 1216 and again in 1217 to show that they were willing to govern in good faith. The second reissue was accompanied by the Charter of the Forest, which codified law in royal woodlands, softened the punishments for poaching and reduced the area of English countryside designated as royal forest land. To differentiate between the two agreements, people began to refer to the original charter as Magna Carta.

The legend of Magna Carta began to grow. During the 13th century it was reissued several times. Sometimes the barons demanded it as a quid pro quo for agreeing to support royal military expeditions. Sometimes the crown re-granted it to settle political crises. In all, 24 of these medieval editions survive, including the fine 1297 edition that was bought at auction for \$21.3 million by the American financier David Rubenstein in 2007 and is on permanent loan to the United States in the National Archives in Washington, D.C. The most recent edition to come to light was discovered just in February, tucked into a Victorian scrapbook in the archives of the British seaside town of Sandwich. Even badly damaged, it was estimated to be worth about \$15 million.

By the end of the 13th century Magna Carta's terms were becoming less important than its symbolic weight—the crown's acknowledgment that it was bound by the law. Though Magna Carta may not have been much cared for during the Tudor years of the 16th century—Shakespeare's play *King John* makes no mention of the great charter, concentrating instead on Arthur of Brit-

tany's death—it roared back into life in the 17th century. The great lawyer and radical politician Sir Edward Coke made Magna Carta the foundation of his opposition to Charles I—who lost his head in 1649 for refusing to accept that he should be bound by the law.

By then the document's influence was spreading beyond the British Isles;

clauses from Magna Carta were written into statutes governing the American colonies from as early as 1639. Later, when the people of Massachusetts rebelled against the Stamp Act, they pointed out that it violated the core principles of “the great Charter.” When the colonies overthrew British rule altogether, the Declaration of Independence condemned George III for obstructing the administration of justice, “for imposing Taxes on us without our Consent; for depriving us in many cases, of the benefits of trial by jury” and for “transporting large armies of foreign mercenaries to complete the works of death, desolation and tyranny.” Nearly identical complaints had been lodged against King John 561 years before. Magna Carta also influenced the state-building that followed. Article III of the Constitution stipu-

lates that “the trial of all crimes, except in cases of impeachment, shall be by jury,” and Articles V and VI of the Bill of Rights—which hold, respectively, that “No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a grand jury . . . nor be deprived of life, liberty or property without due process of law” and that “In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial”—are essentially paraphrases of Magna Carta Clauses 39 and 40.

Around the world, from Canada to Australia, other founding consti-

tutional texts also leaned heavily on Magna Carta. Parts of the charter can be found in the European Convention on Human Rights and in the U.N. Universal Declaration of Human Rights, which Eleanor Roosevelt called “a Magna Carta for mankind.”

Back at Runnymede there is surprisingly little in the way of monuments to the charter. The American Bar Association has put up a small stone structure there with eight pillars, a saucer-shaped roof and a stone stump bearing an inscription: “To Commemorate Magna Carta: Symbol of Freedom Under Law.” The British have erected nothing major. The closest they got was when the radical politician Charles James Fox proposed putting up a gigantic pillar to commemorate the centennial of the Glorious Revolution of 1688-89. The proposal failed, but it was just as well: Runnymede is on a flood plain. Had it been built, the pillar would have probably sunk into the marshy ground.

Plenty of pageantry has already greeted the eighth centenary. The British Library's current exhibition displays its two copies of the 1215 Magna Carta alongside Thomas Jefferson's handwritten Declaration of Independence and the Bill of Rights, on loan from the New York Public Library and the National Archives, respectively. Almost every town with even the slightest connection to Magna Carta is hosting an event. Medieval fairs are planned. Magna Carta beer is being brewed. A giant embroidery of the Magna Carta Wikipedia page, designed by the artist Cornelia Parker, is on exhibit at the British Library. Salisbury Cathedral will feature a king-size Magna Carta cake iced with a transcription of the original Latin.

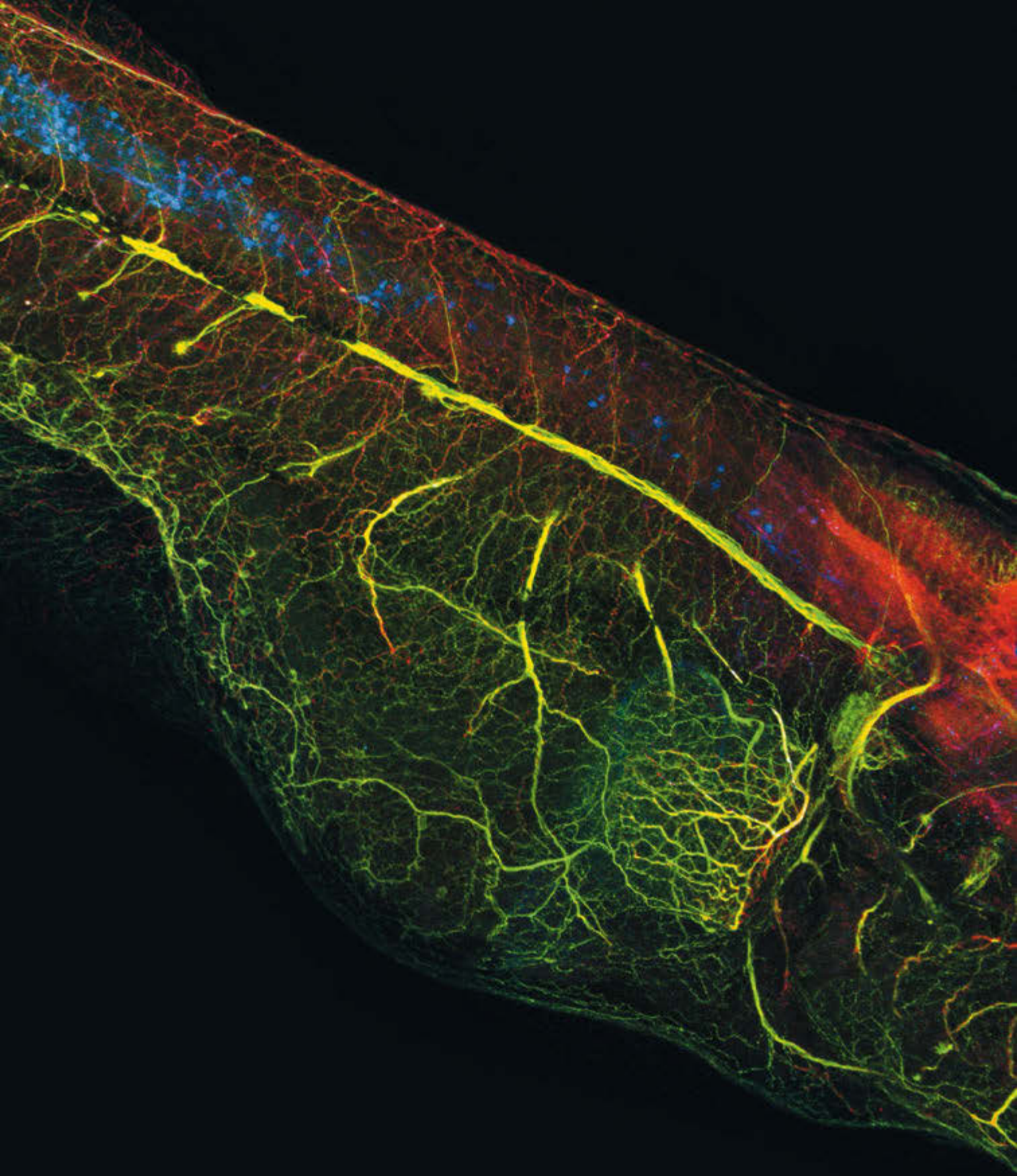
Profound or parochial, it all matters. The celebrations will not simply mark the granting of the charter, which in 1215 was really a short-lived peace treaty issued in bad faith by a grudging monarch. Rather, the celebrations will pay tribute to law, liberty and the principles of democracy that take Magna Carta as their starting point.



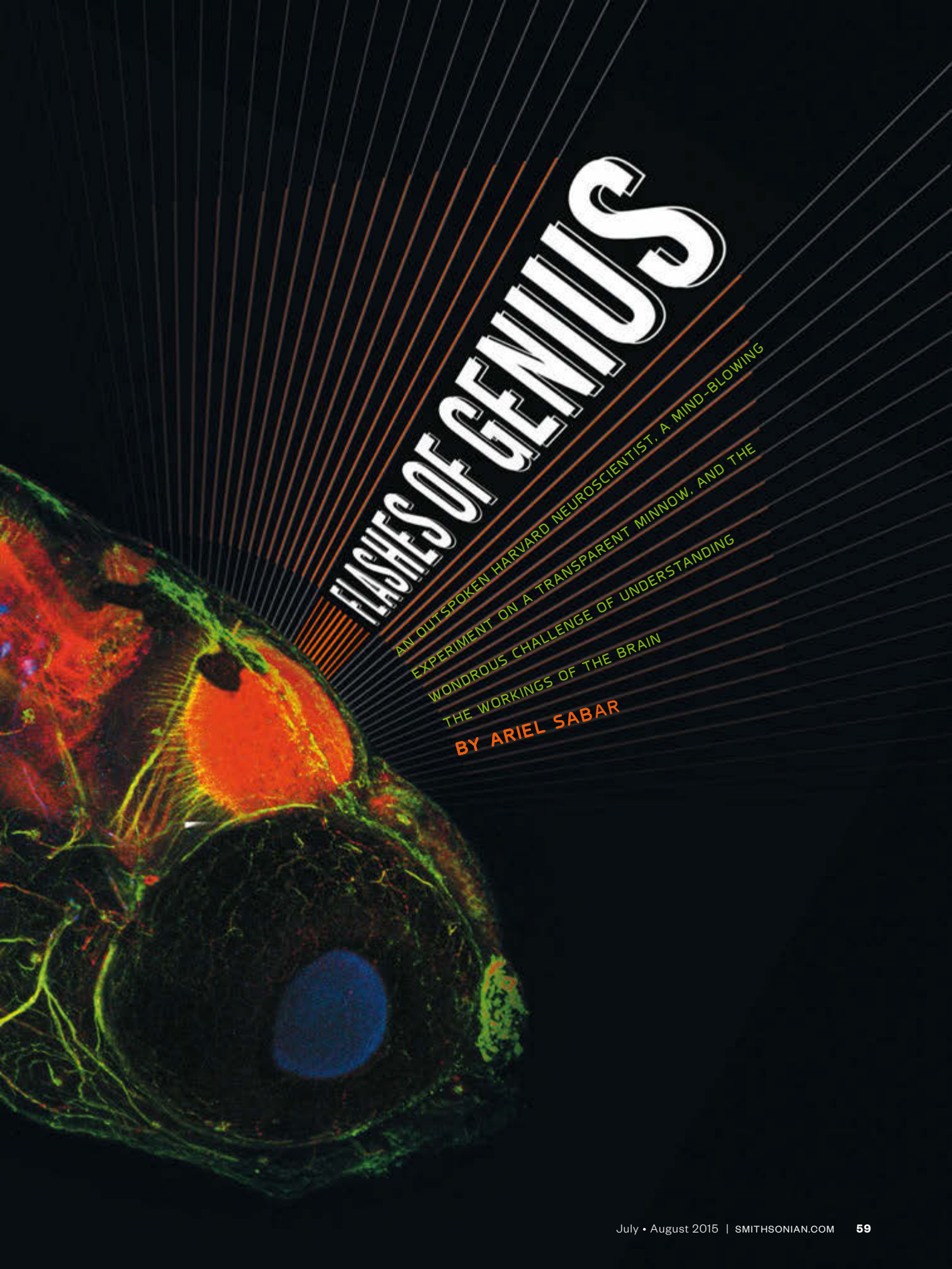
MONUMENTAL ACHIEVEMENTS
In February, the British Library reunited all four surviving copies of King John's Magna Carta (opposite, top) for the first time in 800 years. A 1297 copy (opposite, bottom) is now at the National Archives, and the American Bar Association has erected a memorial to the events at Runnymede (above).



See the merchandising of the Magna Carta anniversary at Smithsonian.com/kitsch



About 80 percent of genes linked to human disease have a counterpart in the zebrafish.



FLASHES OF GENIUS

AN OUTSPOKEN HARVARD NEUROSCIENTIST, A MIND-BLOWING
EXPERIMENT ON A TRANSPARENT MINNOW, AND THE
WONDROUS CHALLENGE OF UNDERSTANDING
THE WORKINGS OF THE BRAIN

BY ARIEL SABAR

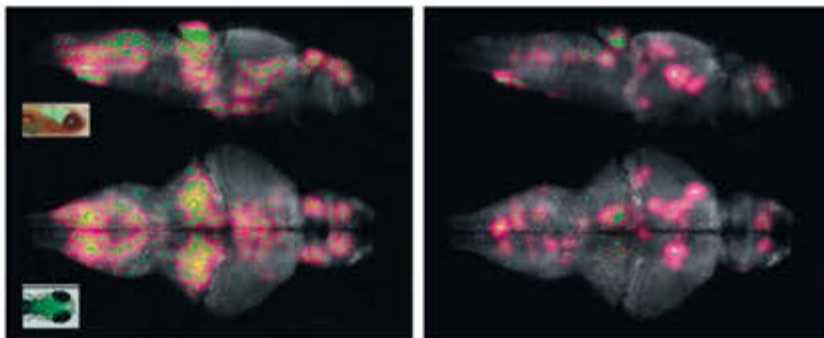
BRAIN POWER

For the first time, Florian Engert and his team mapped every firing neuron in a living animal. The images below (side and top views) show the zebrafish brain during swimming (left) and visual stimulation alone (right).

In televised remarks

from the East Room of the White House on April 2, 2013, President Obama unveiled a scientific mission as grand as the Apollo program. The goal wasn't outer space, but a frontier every bit as bewitching: the human brain. Obama challenged the nation's "most imaginative and effective researchers" to map in real time the flickerings of all 100 billion nerve cells in the brain of a living person, a voyage deep into the neural cosmos never attempted at so fine a scale. A panoramic view of electric pulses pinballing across the brain could lead to major new understandings of how we think, remember and learn, and how ills from autism to Alzheimer's rewire our mental circuitry. "We have a chance to improve the lives of not just millions," the president said, "but billions of people on this planet."

The next month, six miles from the White House, a Harvard professor named Florian Engert grabbed a mic and, in front of the nation's top neuroscientists, declared Obama's effort essentially futile. "We have those data now," said Engert, who, in a room full of professorial blazers and cardigans, was wearing a muscle shirt that afforded ample views of his



FLORIAN ENGERT (2); PP. 58-59
DR. DOMINIK PAQUET



bulging biceps. “We discovered they’re actually not all that useful.” (“I think whole-brain imaging is just a bunch of bull---,” is how he put it to me later.) To the other researchers, he must have sounded like a traitor.

Engert, who is 48, was basically the first person on the planet to observe a brain in the wall-to-wall way Obama envisioned. He and his colleagues had done it with a sci-fi-worthy experi-

ment that recorded every blip of brain activity in a transparent baby zebrafish, a landmark feat published just a year earlier in the marquee scientific journal *Nature*. For Engert to suggest that the president’s brain quest was bunk was a bit like John Glenn returning from orbit and telling JFK not to bother with a lunar landing.

“He should be an advocate,” says Miyoung Chun, a molecular geneticist

and executive at the Kavli Foundation, a leading backer of neuroscience research. “Many other neuroscientists are celebrating what he was able to accomplish, but he himself is shutting it down.”

But Engert was trying to make a point: Whole-brain recording, in his view, is not necessarily the best path to new discoveries about the three pounds of flesh between our ears. “You

can find patterns, sequences, clusters, correlations and areas of blips. And then what?" he told me. It's a lot of data without a lot of understanding.

The White House—and many scientists—were pinning too many hopes, Engert thought, on too narrow an idea of how to understand the brain. At stake in his critique are questions not just of methods, but of the very goals of neuroscience. How much should we expect to grasp in our lifetimes about phenomena like memory, sleep and consciousness? What should the field's highest calling be? Should it be cures for disease, or are other lines of inquiry just as worthy?

Engert relishes controversy, especially when he's at its center. It's a dangerous game for an academic, but his science saves him. This past September, the Obama administration awarded him one of the new brain mission's largest grants, anointing him a leader of the very effort he can't stop dissing.

memories; how we feel emotion; how neurons encode data from our senses and how they draw on that data to orchestrate behavior; how those circuits change in people with psychiatric and neurological disease.

Until very recently, scientists could record from only a few hundred neurons at a time, even in lab animals. They did it by sinking electrodes into each of those cells. But the more cells you try to track at once, the greater

**"THE TECHNOLOGY
WAS THERE TO DO
THAT EXPERIMENT,
BUT NO ONE HAD.
ONLY FLORIAN WAS
NUTTY ENOUGH."**

rice paddies along the Ganges, in India and Bangladesh. In the West, the blue and gold striped fish are better known as your basic starter aquarium species. In the 1970s, scientists saw in these inconspicuous creatures the makings of the next big lab animal. Zebrafish breed fast, cost little and have genes that are easy to manipulate. And for the first few days of their lives, zebrafish, brains to tail, are see-through. To read the minds of baby zebrafish, scientists later realized, all you had to do was look.

After years of trial and error, Engert and his lab members pulled off a wild experiment. Engert code-named it "Fish in The Matrix," after the sci-fi film trilogy about people who think they're leading ordinary lives but are in fact sealed in pods, their brains wired to a virtual-reality machine. The experiment took aim at a basic question: What happens in the brains of baby zebrafish as they learn?

At first, it wasn't clear anyone could teach a baby zebrafish anything. En-



MODEL ORGANISM

Zebrafish have been popular among developmental biologists since the 1970s. The fish lay 100 to 200 eggs per week, which grow into larvae one-fiftieth of the size shown here.

Thousands if not millions of brain cells have to talk to one another for a person to perform even the most basic task, like lifting a glass of water. The cells exchange messages in the form of electrical pulses, which race at millisecond speeds along networks of fibers spanning every region of the brain. At almost every moment, that is, the brain's Beijing is on the phone to its Helsinki, with La Paz and Kampala patched in on conference. These circuits of activity are thought to underlie some of the brain's greatest mysteries: how we store and recall

your risk of killing the animal or shorting your electronics. Sure, functional MRI machines image the whole brain, but they track blood oxygen levels, not electrical activity, and the resolution is far too crude for the study of circuits at the cellular level. Which is why Engert's 2012 *Nature* paper on the eyelash-size baby zebrafish landed with a whale of a splash. His team had found a way to record an animal's entire brain with the sweep of an fMRI and the cell-by-cell precision of electrodes.

Zebrafish are freshwater minnows native to streams that burble through

gert and his colleagues tried for years to trigger lasting changes in behavior by giving the fish mild shocks or rewarding them with alcohol or cocaine, all to no avail. But, by instinct, zebrafish swim against a current, a reflex that keeps them from getting washed into a rice paddy or, worse, out to sea. What if scientists could make the fish *think* that this hard-wired reflex wasn't working right? Would the fish learn to adapt?

The researchers obtained a line of genetically engineered zebrafish whose neurons flash green when they fire; the cells produce a fluorescent dye

that glows brighter in the presence of calcium ions, which flow in when the cell is firing. The fish had to be motionless, so the green flashes wouldn't blur under a microscope, and still have the illusion of freedom.

Engert and two of his postdocs, Misha Ahrens and Ruben Portugues, paralyzed the fish with a snake-venom toxin and suspended it in water in a clear petri dish. To mimic the visual experience of swimming in a stream, they set a projection screen under the petri dish and displayed a set of moving bars. From electrodes patched to nerves in the fish's tail, the researchers sensed what the brain was telling the tail to do, even though the tail itself couldn't actually move. A computer slowed the bars when the fish flicked—or thought it was flicking—its tail, so it would get a visual cue that it was successfully holding its place in the moving water.

Then came the brainwashing. When the fish “swam,” the researchers slowed the bars too much or reversed their course, with the goal of making the animal think its tail had become super-strong. Or they made the bars slow too little, duping the fish into thinking its tail was abnormally weak. In each case, the fish compensated, either decreasing its tail flicks or increasing them: whatever it took to stay put in the virtual stream. Not only did zebrafish after zebrafish recalibrate their tail flicks, they later remembered to do so: They learned. When the scientists gave the fish a ten-second break and then returned the bar speed to its realistic setting, the fish initially lashed their tails as though they were still either too strong or too weak.

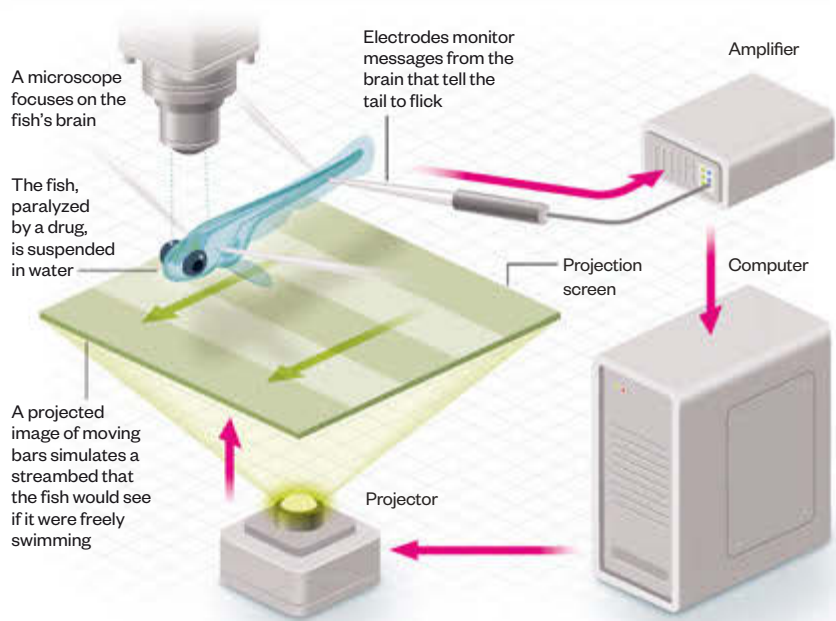
Videos of the fish's 100,000 neurons, filmed through a high-powered microscope, show fields of glittering green, twinkling in areas associated with vision, movement and learning. Of particular note was a set of brain cells that had no clear tie to vision or movement, and that flashed only when the fish realized their tails were weaker or stronger than expected. Engert theorized that these cells played a role in “surprise” or “error detection.”

CONTINUED ON PAGE 110

HOW TO FOOL A FISH

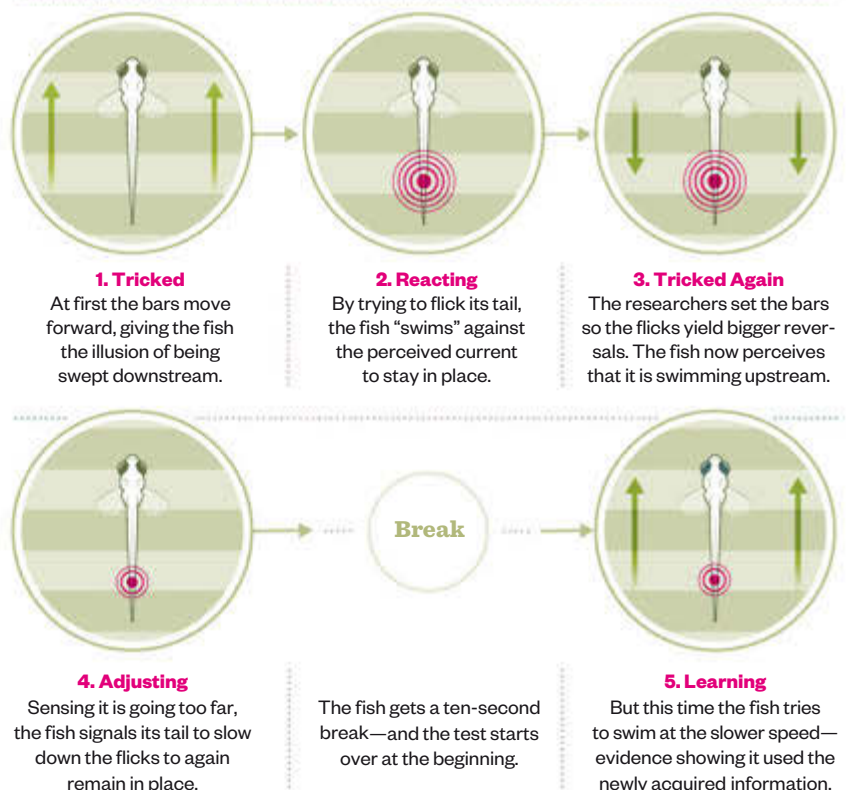
What happens in an animal's brain when it learns something new? Scientists found out in an elaborate experiment that gave a stationary zebrafish the illusion it was swimming

THE SETUP



Each time the fish tries to flick its tail, the computer reverses the moving bar image for an instant, reinforcing the fish's illusion of swimming

THE EXPERIMENT





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**Smithsonian
JOURNEYS**

PAST AND PRESENCE

The shattering nature of violence. The resilience of the human spirit.
The **power of photographs**. A Smithsonian special project



Every act of violence rends the fabric of time, and the frayed threads can never be completely stitched back together. The following photo essays examine three historic violent encounters through different time frames—from a chronicle of the unfolding event itself, to emotional portraits of the event's last victims, to scenes where the protagonists have faded away, leaving nothing but the landscape to bear witness.

Jon Lowenstein's raw photographs of the street protests in Ferguson, Missouri, one year ago capture the outrage at the heart of a new American civil rights movement.

Diana Markosian's images find the last survivors of the Armenian genocide, 100 years after an atrocity the world has still not come to terms with, and visually reconnect them to their long-lost homeland.

In the American South, **Eliot Dudik** commemorates the Civil War, which ended 150 years ago, in haunting battlefield panoramas that remind us of the cost in blood of our nation's second revolution.

No matter how far back in history they reside, these events are still the subjects of heated argument and painful scars. All are central to a sense of identity, of self, community and nation. Together, these photos pose the questions: What are the marks that violence leaves behind? How do you see history as time passes?

CIVIL WAR <<<> 150 YEARS LATER

Walking far-flung battlefields to picture
the nation's **defining tragedy** in a modern light

AMERICAN REQUIEM



photographs by **ELIOT DUDIK** • text by **ABIGAIL TUCKER**

In “Poem of Wonder at the Resurrection of the Wheat,” Walt Whitman describes a landscape that is oblivious to human suffering, with “innocent and disdainful” summer crops rising out of the same ground where generations lie buried. He published the lyric in 1856, not long before the Civil War transformed peach orchards and wheat fields into vistas of mortal anguish.

The “Broken Land” photography series, by Eliot Dudik, seems to challenge Whitman’s vision of an indifferent earth: In these bat-

tlefield panoramas, the new life of 150 summers can’t seem to displace death. Seasonal change is just another ghostly note in these images. Fresh snow, high cotton—it hardly matters. Moss advances in Shenandoah River bottoms and clouds storm Lookout Mountain, but nature never conquers memory here. The soil still looks red.

Dudik, who spent his childhood in Pennsylvania, moved to South Carolina in 2004. “Conversations there always seemed to turn toward

HARPERS FERRY, WEST VIRGINIA

SEPTEMBER 12-15, 1862

John Brown tried to take the town’s Federal armory in 1859. In 1862, Stonewall Jackson succeeded, capturing 12,000-plus Yankees—the largest surrender of U.S. troops in the war.



the Civil War,” he says, and that made him “realize the importance of remembering and considering.” He embarked on “Broken Land” three years ago, and so far has photographed about a hundred battlefields in 24 states. He’s now founding a photography program at the College of William & Mary in Williamsburg, Virginia; this summer, while he’s on break, he hopes to add battlefields in three more states.

Using an antique view camera that weighs 50 pounds, he typically takes only a single, painstaking picture of each battlefield he visits. He prefers to shoot in winter, and “in rain, and on really overcast and nasty days. Blue sky is kind of my nemesis.” The subdued light makes landscapes look perfectly even. “I avoid the grandiose, the spectacular, the beautiful. It helps the viewer consider what’s being photographed.”

In Dudik’s pictures, trees are everywhere. “If I could take pictures of trees for the rest of my life, I would,” he says. He likes how their vertical forms balance long horizons, but they are spiritual presences, too. They go gray or blue, depending on the light. They hold the line, beckon, surrender.



See more of *Eliot Dudik's* battleground photos at Smithsonian.com/brokenland





OLUSTEE, FLORIDA

FEBRUARY 20, 1864

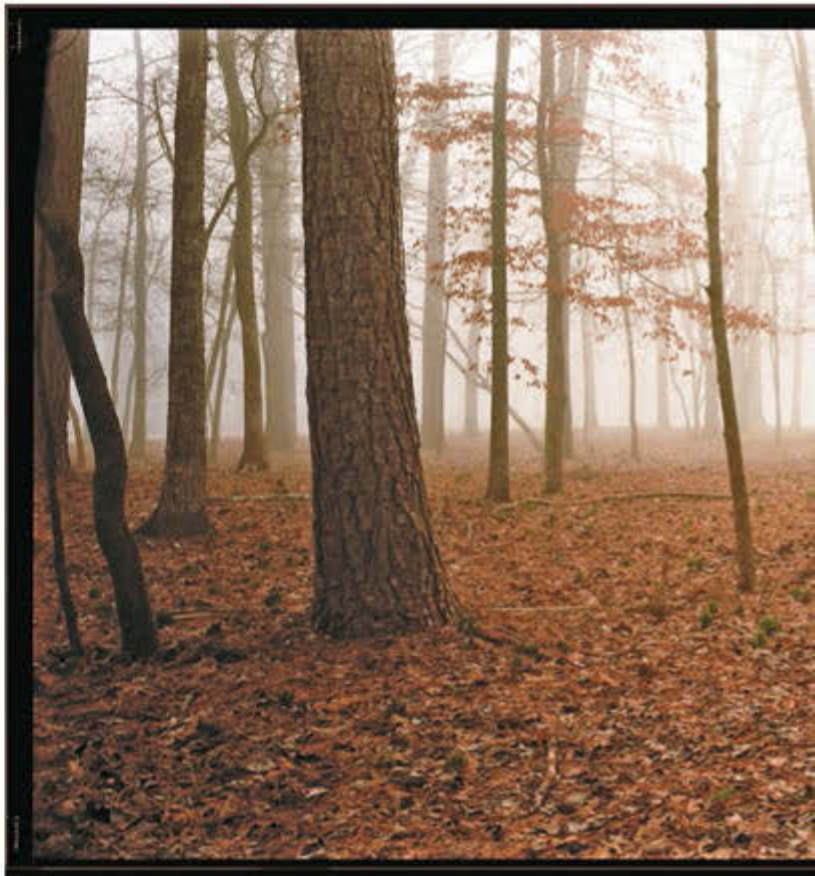
"Most of the wounded colored men were murdered on the field," a Union general wrote. The Rebels' pause for slaughter allowed the surviving Yankee troops to escape.



LOOKOUT MOUNTAIN, TENNESSEE

NOVEMBER 24, 1863

It was immortalized as the "Battle Above the Clouds." But U.S. Grant (whose troops won) wrote that there "was no action even worthy to be called a battle. . . . It is all poetry."



CHICKAMAUGA, GEORGIA

SEPTEMBER 18-20, 1863

"We were too tired to heed the dead bodies lying all around us," a Rebel recalled. The bloodiest battle in the Western Theater inflicted a total of 34,000 casualties.



BIG BLACK RIVER BRIDGE, MISSISSIPPI

MAY 17, 1863

**Exhausted Rebel soldiers
“seemed to expect a de-
feat,” a Northerner wrote.
They fled, burning a wood-
en bridge (later replaced
by the one pictured here).**







FALLING WATERS,
WEST VIRGINIA

JULY 2, 1861

Virginians had voted to secede just two months before. But soon after, western counties rebelled against the rebellion. They entered the Union as West Virginia in 1863.



As children, they escaped
ruthless state-sponsored
violence. Now, a century later,
these Armenian women and
men **visit the aching memory**
of what they left behind

THE ENDLESS EXILE

photographs by **DIANA MARKOSIAN** • text by **JENNA KRAJESKI**



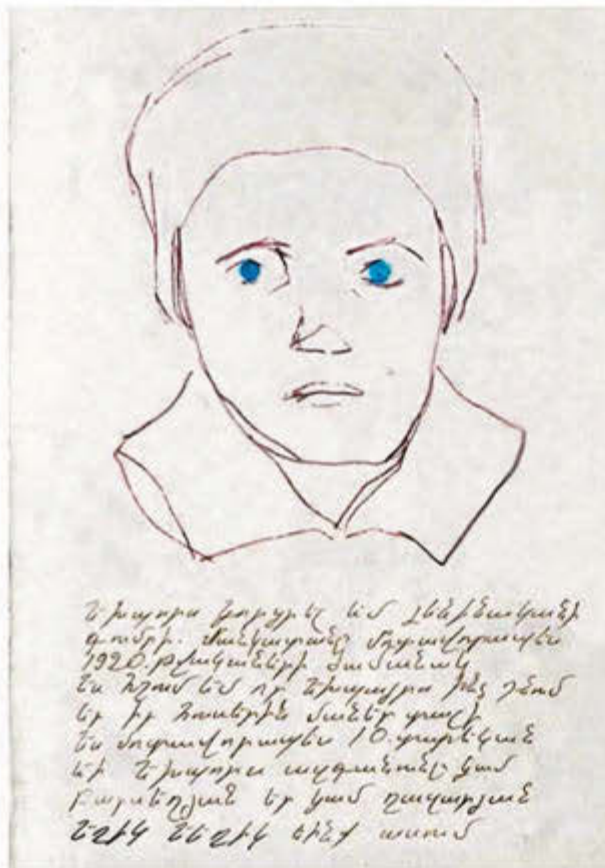


Few places are more important to Armenian

national identity than Mount Ararat, the snowcapped peak that looms over Yerevan, the capital city. A centerpiece of Armenian folklore and religious history where Noah's Ark is said to have landed, the mountain evokes pride and a sense of place. It is featured on the Armenian coat of arms and currency. But it also looms as a reminder of the tragedy that has dominated Armenian life: Mount Ararat is visible from Armenia, but it belongs to Turkey.

A hundred years ago, as the Ottomans anxiously tried to hold together their collapsing empire, they launched a campaign of ethnic cleansing against the territory's Armenian population, whom they feared as a threat to Turkish rule. Between 1915 and 1923, Ottoman forces killed 1.5 million Armenians and expelled half a million more in what is widely considered the first major genocide of the 20th century. Men, women and children were marched to mass graves in the Syrian desert or massacred in their homes. Ottoman soldiers destroyed Armenian churches and villages and confiscated property. Survivors fled into Armenia, then a republic that would soon be swallowed by the Soviet Union. Others scattered around the world.

The Armenian-American photographer Diana Markosian, who had a great-grandfather from eastern Turkey who survived the genocide because Turkish neighbors hid him until it was safe to flee, has undertaken to document the



Yepraksia Gevorgyan fled Turkey along the Araks River, which she recalls as “red, full of blood” from the corpses that Ottoman soldiers tossed into the water. Her father was among them. Her mother died soon after they crossed into Armenia. At left is a portrait her grandson (above) drew of her brother, based on her description. She never saw him again after he was adopted from an orphanage nearly a hundred years ago.







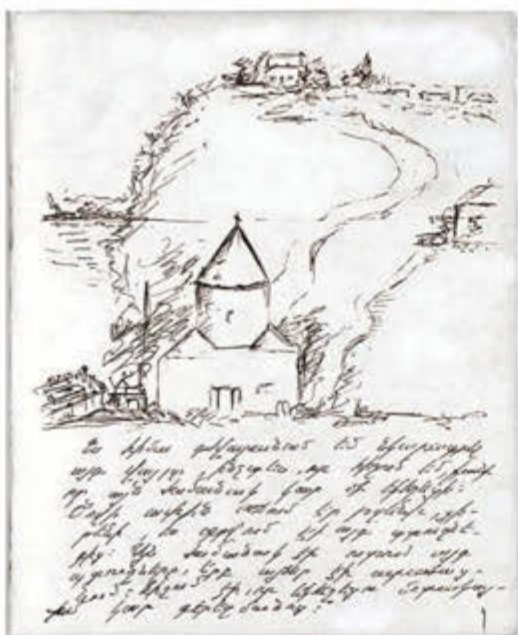
The city of Ani, located in Turkey's Kars Province, was the capital of Bagratid Armenia until a dispute about royal succession led to the kingdom's fall in 1045. Known as the "City of 1,001 Churches," it was eventually captured by the Seljuk dynasty, which built Anatolia's first mosque. By the 17th century the city was in ruins; today it is deserted save for sanctioned tourists and the occasional contingent of Turkish border guards.

national memory of the event in portraits of living survivors. Raised in Moscow, Yerevan and Santa Barbara, California, Markosian says that she long felt the weight of the genocide as a burden, a "monstrous history you inherited because of your ethnicity." It's a history that hasn't been fully acknowledged. To this day, Turkey disputes the extent of the killings and denies that they were planned by Ottoman officials, and the U.S. government declines to recognize the atrocities as a "genocide," a word no sitting American president has used to describe the fate of the Armenians.

Consulting voter registries to track down Armenian citizens born in Turkey before 1915, Markosian found some survivors still alive in Armenia, now an independent nation of three million people. She photographed them in their homes and, later, after traveling to the places they had fled, she reunited the survivors with images of their lost hometowns and documented the reunions.

The images are surreal meetings at the crossroads of place and memory. Farmland has overtaken villages; ancient mountaintop churches stand in ruins. Some of the survivors wept when they saw her photos of their former homes, which beckoned like Ararat in the distance, enduring but out of reach. "I wanted to help the survivors reclaim a part of their own history," Markosian says. "But how do you show something that's not there?"





Movses Haneshtyan was 5 when he escaped his village in 1915. He asked Markosian to place his picture in his old church (middle), which she found in rubble. She located it from a map (bottom) drawn by a relative of Haneshtyan. When presented with an image of the road leading to his hometown (above), Haneshtyan wept, reached out to touch it and sang, "My country, my home. You've brought the smell of my village to me."





Now 101, Mariam Sahakyan was born in Sason, in southeastern Turkey (middle), which is rich with farmland. She asked Markosian to bring her back soil. She wanted to be buried with it. "As a photographer I'm always taking," Markosian says. "Here for the first time I felt like I was giving something." At bottom is a family tree, a common project among Armenian households, which often contains all that is known about survivors.



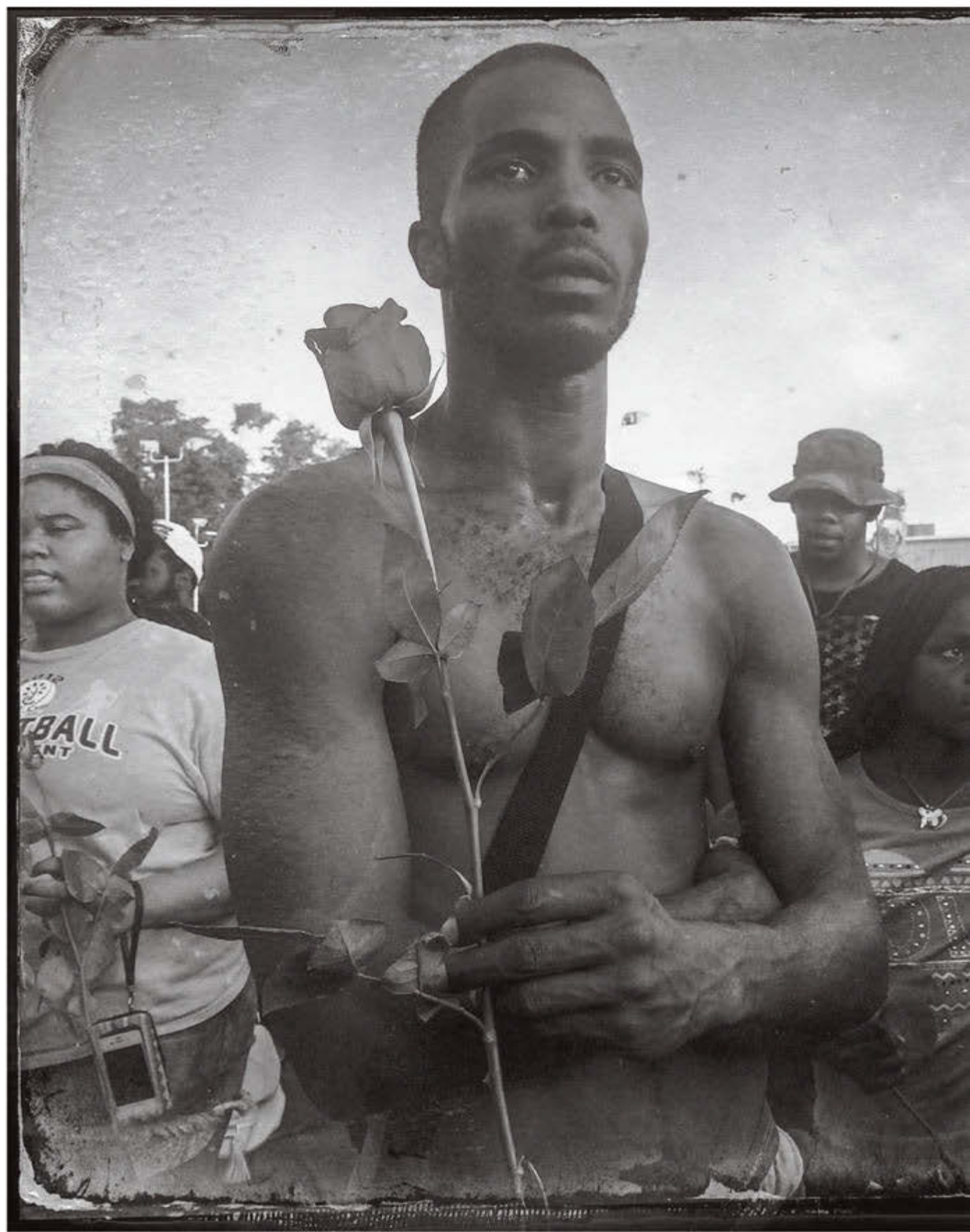




The National Archives in Yerevan house volumes, like those at left, collecting documents related to the genocide, including defunct property records and applications for Turkish-born Armenians waiting to be allowed into Armenia. But many heirlooms, like family photographs taken in Turkey (top right) and a centuries-old jeweled cross (above) remain with the families who brought them over during the deportations. ○



See more of Diana Markosian's Armenian project photos at [Smithsonian.com/armenia](https://www.smithsonian.com/armenia)

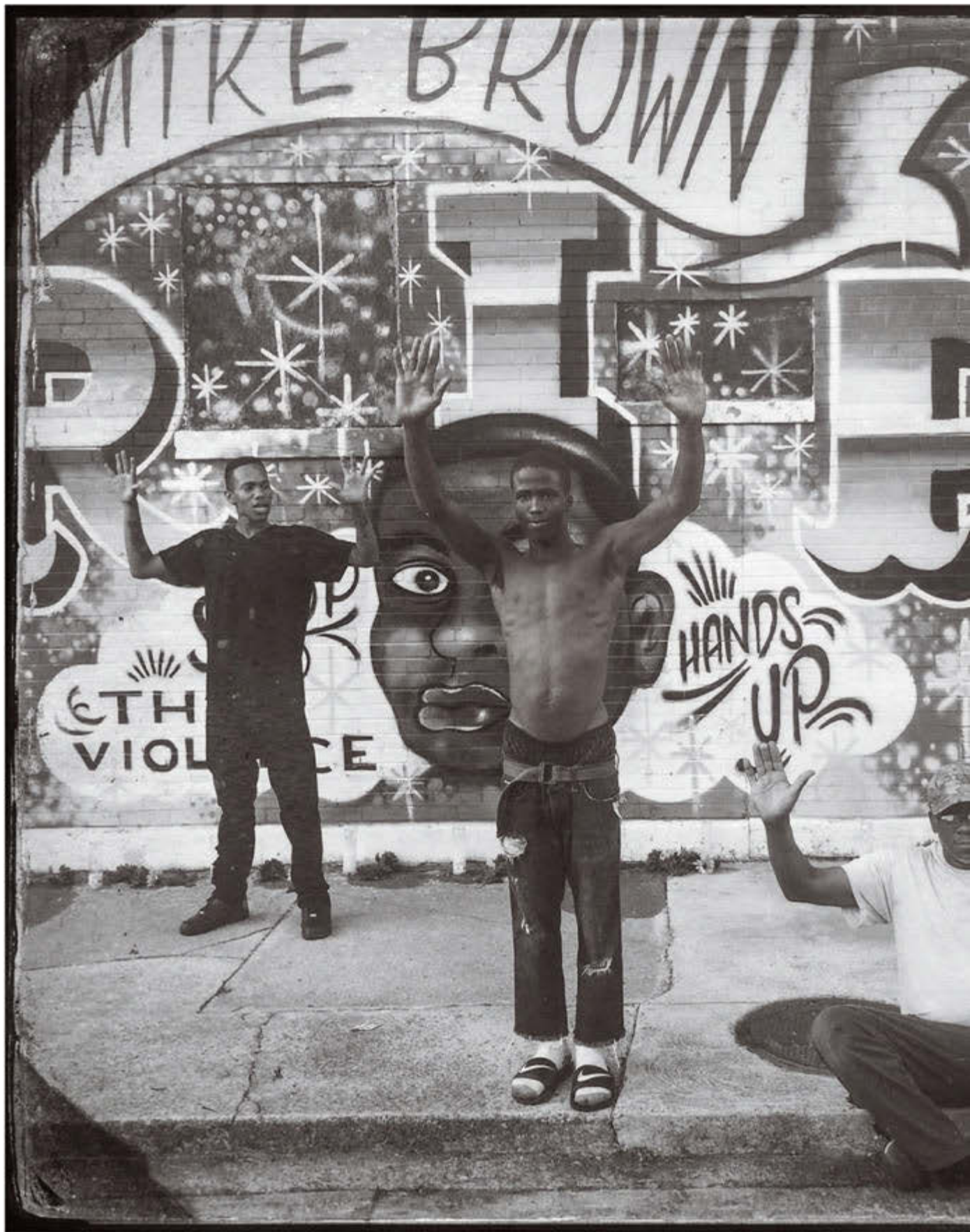


THE VIGIL

The protests sparked by the killing of young Michael Brown gave rise to a new civil rights movement that's still growing
photographs by JON LOWENSTEIN • text by MATTHEW SHAER

On a mild evening last November, hundreds of protesters gathered at the intersection of West Florissant Avenue and Canfield Drive in the heart of Ferguson, Missouri. It had been 104 days since the shooting of Michael Brown; soon, a grand jury would decide whether to indict Officer Darren Wilson for Brown's death. The mood was one of rage but also of hope. There was music and dancing. A pair of young people climbed atop a generator and told the crowd to make its voice heard. Nearby, an American flag waved. "People believed that the country was finally paying attention to what was happening in Ferguson," recalls the photographer Jon Lowenstein, who was in the crowd that evening and spent several months documenting the turmoil with his iPhone.

The demonstrations that followed Brown's killing—and which were sparked anew when the grand jury declined to indict Wilson—were not the first in the 21st century triggered by the killing of a young black man. But Ferguson represented something new: a sweeping call to action that, thanks in part to the tactics of the police determined to quash it, blossomed into a genuine cultural movement, with leaders like the 29-year-old former Minneapolis school administrator DeRay Mckesson and placard-ready slogans like "Hands up, don't shoot."





In March, a Justice Department investigation into police and judicial practices in Ferguson found evidence of systemic “intentional discrimination.” The vast majority of unjustified arrests by Ferguson police officers involved African-Americans, as did instances of the unreasonable use of force. “It is not difficult to imagine how a single tragic incident set off the city of Ferguson like a powder keg,” then-Attorney General Eric Holder said upon the report’s release.

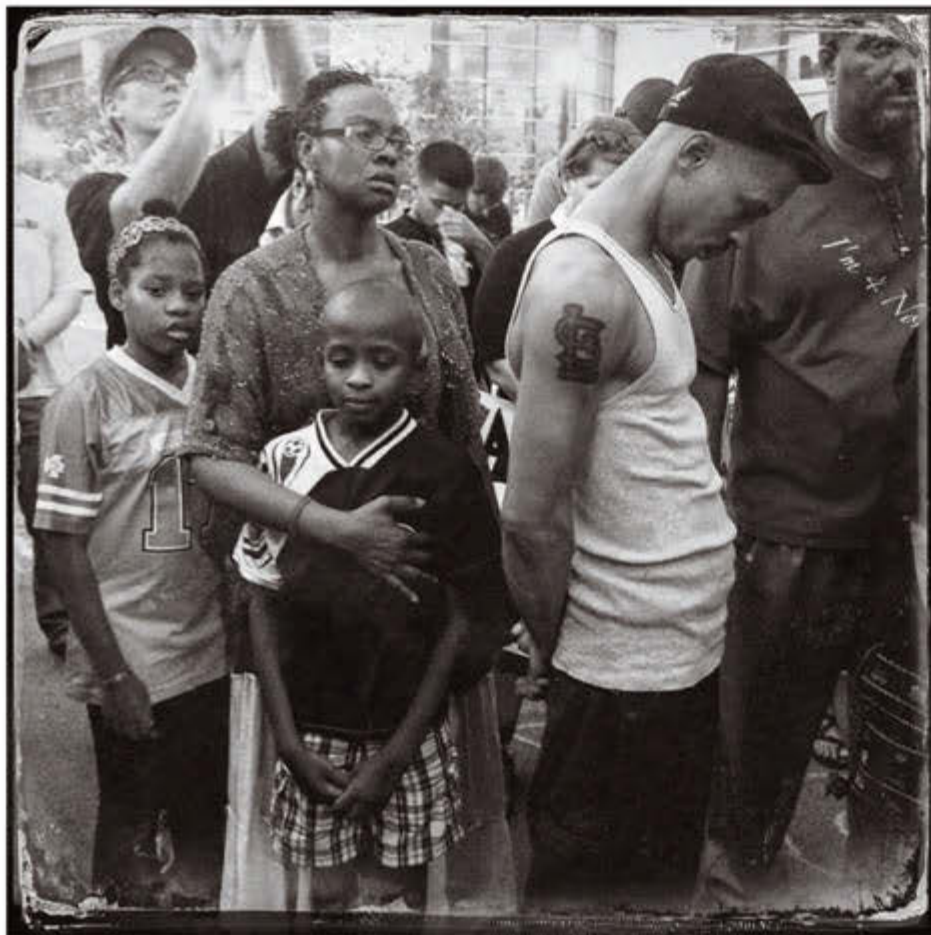
A range of Ferguson officials were replaced, from the police chief to the city manager to the municipal judge. In the spring, a record number of voters elected two new black candidates to the city council.

The momentum generated last summer to counteract police brutality has grown. One need only look to President Obama’s call for \$75 million to purchase body cameras for police departments across the country. Or the outcry over the killings of unarmed black men and women in places like New York, South Carolina and Cleveland. Or—not least—the reaction to the killing of Freddie Gray, a Baltimore man who died in police custody in April. Six cops have been indicted for their role in Gray’s death. For many, hope has returned. “It’s all connected,” says Lowenstein. “Ferguson proved that people could actually hold those in power accountable.”

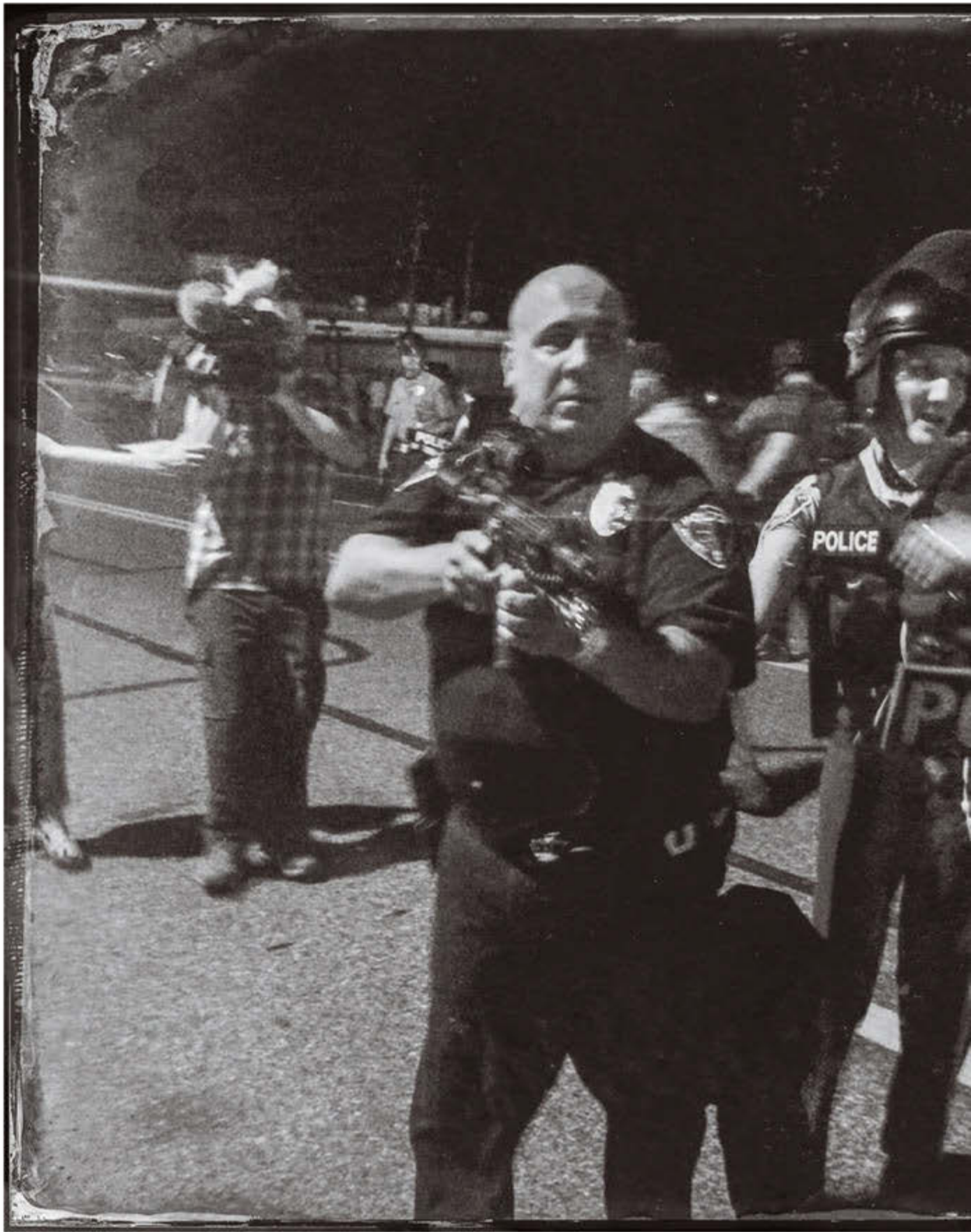


The day before Michael Brown’s funeral, artist Joseph Albanese painted a mural in St. Louis, 12 miles from Ferguson. “It was a place where people were coming together to remember,” Lowenstein says. Three months later, demonstrators in Ferguson (above) waited hopefully for an indictment of Officer Darren Wilson. When he was not charged, protests again turned violent.

Ten days after Brown's death, police in St. Louis killed Kajieme "Chris" Powell, a mentally disabled 25-year-old who was suspected of stealing doughnuts from a convenience store. Cellphone video footage of the shooting inspired residents, like the woman at right, to join the growing protests. At an interfaith demonstration in Clayton, Missouri (below), a woman holds a young boy.





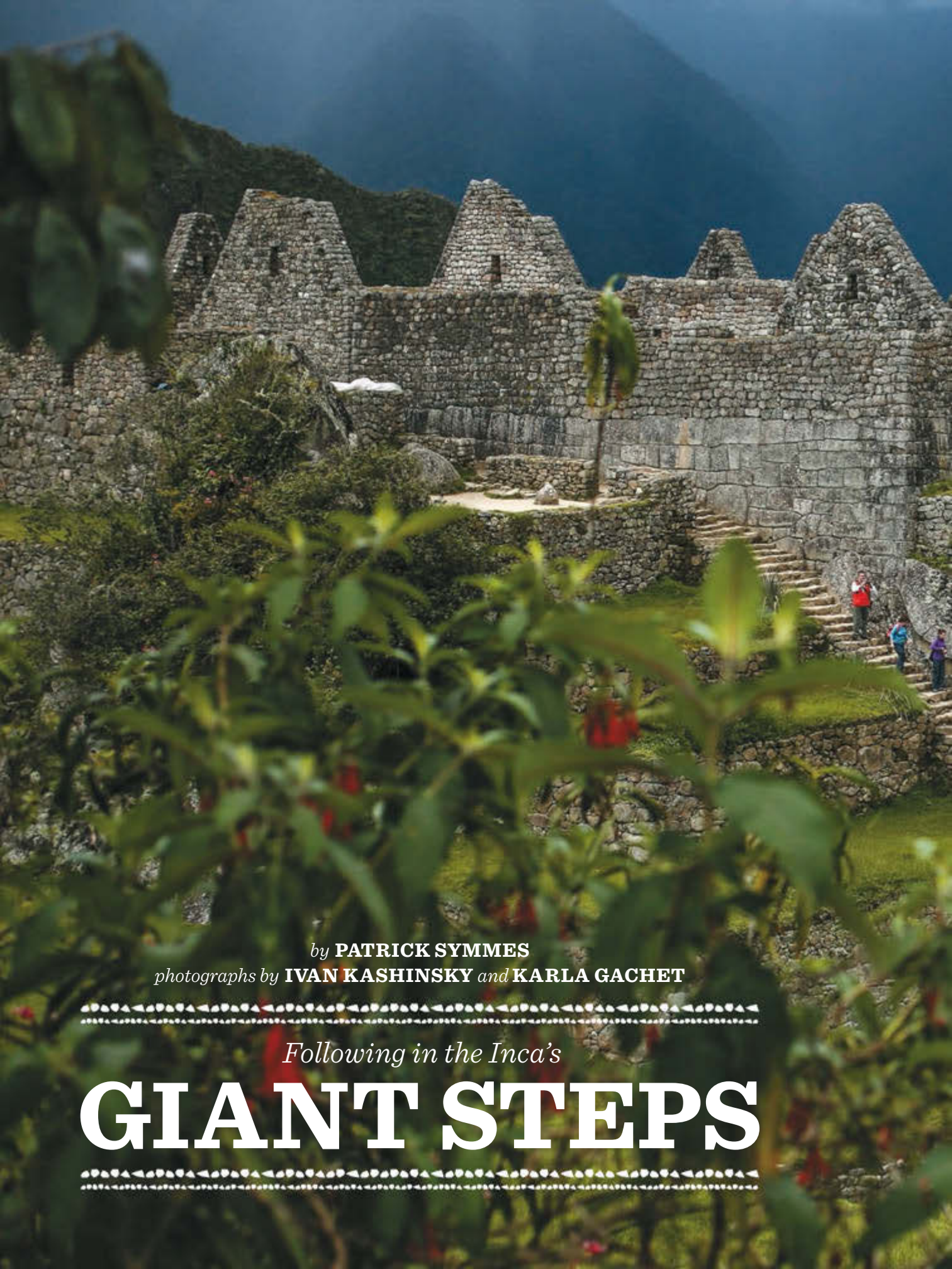




Ray Albers (left), a veteran of the St. Ann, Missouri, police, resigned after video captured him raising his assault rifle and threatening to kill unarmed protesters in Ferguson. The makeshift memorial set up where Brown was shot on Canfield Drive (above) grew until it was removed by his father, Michael Brown Sr., on May 20 of this year, which would have been his son's 19th birthday. "It's time for the city to heal," he said. ○

See more of Jon Lowenstein's protest photographs at Smithsonian.com/ferguson





by PATRICK SYMMES

photographs by IVAN KASHINSKY and KARLA GACHET

Following in the Inca's

GIANT STEPS

**A ROCKY ROLICKING
JOURNEY TO MACHU
PICCHU ALONG THE
INCA ROAD, ONE
OF THE GREATEST
ENGINEERING FEATS
IN THE AMERICAS**

THE LAST STRETCH OF ROAD that the emperor of the world descended was dauntingly steep, and its seemingly endless terraced-stone expanse is still there 482 years later.

The stepped, wide-granite thoroughfare spills down, and down, and down, from the Peruvian Andes into the flat valley of Cajamarca.

This section, about 1,100 miles northwest of Cuzco, is part of the “Great Road,” or *Capac Ñan*, as the Inca knew it—the grandest engineering achievement of the pre-Hispanic Americas, stretching roughly 3,700 miles along the Andes, from present-day Colombia

to Chile. During my descent late one afternoon about ten years ago, my knees aching, I was haunted by the specter of Atahualpa, the Inca monarch, who would have perhaps traveled this route to his fatal encounter with Francisco Pizarro, the Spanish conqueror. Atahualpa usually traveled by litter, but he was a young warrior-king in a nation that valued walking, and he might have felt the need, as I did, to prove he could make it down on foot. He would have seen these same curbstones, the countless steps lead-

ing down the hillside into the valley.

The *Capac Ñan* network still exists in remarkably durable portions across six countries of South America, though it was built without iron tools, draft animals, a single arch, or the wheel. With suspension bridges and ramrod-straight roads laid out by ancient surveyors, the road functions as a kind of map of Inca ambitions, an eternal landmark imposed by a preliterate society that left no written documents. It is also the subject of a groundbreaking new exhibition, “The Great Inka



Road: Engineering an Empire,” at the Smithsonian National Museum of the American Indian.

I’d glimpsed other portions of the roadway before as well. Years earlier, I had unwittingly stumbled on sections while riding my motorcycle through central Peru and Bolivia, where people invited me to abandon my wheels and follow them up stone pathways to villages that lay across misty peaks. But this time, determined to explore the road in its full atmospheric power, I took the easiest way to reach the legendary route. I flew to Cuzco, the one-time Inca capital and now Peru’s tourism hub, and stepped outside my hotel.

I was met on the stoop by Donato Amado Gonzalez, a historian with the



Machu Picchu Archaeological Park, a small, intense man who kept a fast pace without apology. Our first stop was only a few blocks away: a wide trash-strewn alley. “It’s called the road of the conquistadores,” Amado said, “because they entered Cuzco right here.”

Underneath centuries of layered mud and garbage lay a stretch of the north road, the Chinchaysuyu. The greatest of the Inca Road’s thoroughfares, it once ran from Cuzco to present-day Quito, Ecuador, and then kept going to what is now Pasto, Colombia. On the right side of the alley was a footpath, a well-trodden remnant of the ancient byway, made of smooth cobblestones. On the left ran a feature of most Inca roads: a canal to control erosion.

Peruvians brushed past me and turned up into a suburban neighborhood.

The Spaniards entered Cuzco by this route only after they had sealed the fate of the emperor in Cajamarca. Pizarro and his tiny band of soldiers lured the imperial entourage into a tight plaza and opened fire with cannon. Pizarro himself seized the emperor by the arm. The invaders agreed to spare Atahualpa’s life if he filled a room, once with gold and twice with silver; when he did, they garroted him anyway. They appointed a rival in his place, and moved south through a demoralized and confused Inca empire, co-opting the elite with promises that nothing would change.

They walked much of the way to

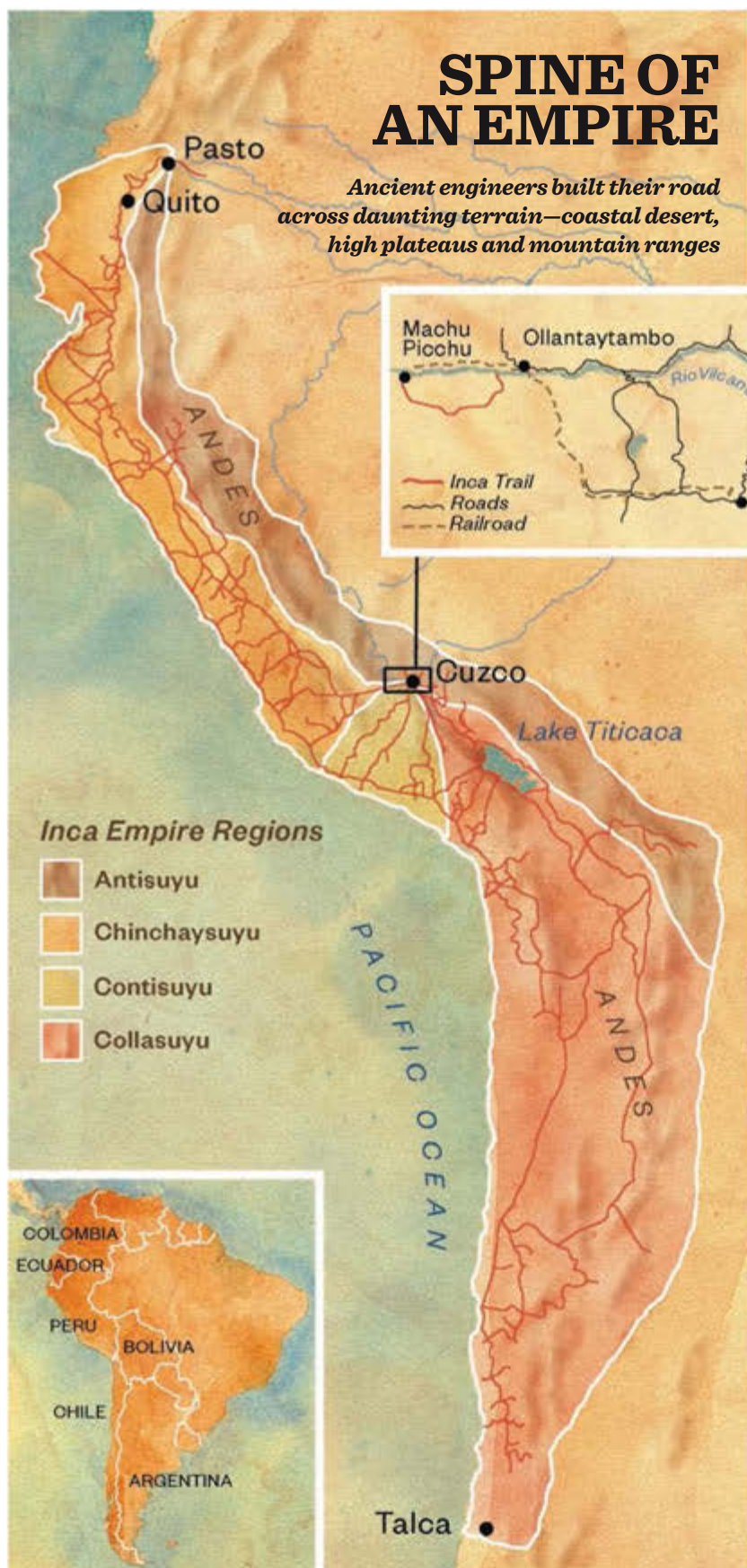
Across the empire, some 25,000 miles of road—including this intact section—led to Cuzco (in the distance). After the Spanish executed Atahualpa (inset, opposite), the highway fell into disuse.

Cuzco, because their horses suffered terribly from the sharp edges of the Capac Ñan’s stepped inclines. Most of the Spaniards were impoverished farmers from the region of Extremadura, and I had to wonder how they felt when they rounded the corner here, and entered the vast plaza at the heart of an empire, surrounded with monumental palaces and temples, everything glittering with gold leaf and brilliant hanging textiles.

Amado blitzed onward at a punishing uphill pace. As we crossed a busy

SPINE OF AN EMPIRE

Ancient engineers built their road across daunting terrain—coastal desert, high plateaus and mountain ranges



road lined with hotels and sweater shops, he pointed to a stretch of byway called the Puma road. It led up to the monumental complex of Sacsayhuaman—an impressive ruin today—and over the mountains to the ritual center of Huchuy Qosqo, or Little Cuzco.

We race-walked to the edge of Cuzco. Finally, high over the city in the failing light of dusk, Amado gestured wide as we stepped around a corner: “There!” he almost shouted. “The royal road!” It was the best-preserved section in Cuzco, a wide, straight portion of the Capac Ñan that ran hundreds of yards, neatly walled on

both sides as it traversed the slopes of a steep hill. There were houses below, and a road clogged with traffic above. The path was more than three yards wide, neatly edged, and still floored with stones worn smooth by Inca religious processions.

A black-on-black thunderstorm was rolling across the open valley toward us, but we continued on the road and climbed up to an *apacheta*, a shrine consisting of a stone pinnacle abutting a smooth stone platform. I asked Amado if every road had a sacred site like this, but he shook his head. “Every sacred site had a road that leads to it,” he said.

Scholars have gone to great lengths to understand the Capac Ñan, among them Karen Stothert, an archaeologist from the University of Texas at San Antonio, who began walking it in 1967 while still a Peace Corps volunteer. “You are talking about thousands of miles in some of the most rugged topography in the world,” she told me by phone. “The road climbs 5,000 feet straight up mountains. Sometimes it is built on a stone ledge, just wide enough for a llama. If you bump your backpack, it can bump you right off the cliff, 2,000 to 3,000 feet down.” She has conducted seminal research on the road system,

◀ Only about 2,000 miles of the original stone-paved Inca Road remain in use.

especially in Ecuador and Peru, documenting and mapping bridges, walls, tunnels and drainage systems on the eastern slopes of the Andes.

Stothert likes to challenge easy versions of Inca history. “First of all,” she says, “we call them Inca roads, but many of us know some parts were built before the Inca.” For at least 3,000 years, other cultures, including the Moche and the Nazca, forged trails that connected to the larger world, and engaged in long-range trade for herbal medicine, gold and hallucinogenic compounds. When the Inca conquered the Andes in the 15th century, they put a stop to that “somewhat egalitarian” society, Stothert says, brutally subduing hundreds of nations. For many ordinary people, the Inca Road meant subjugation and impoverishment.

Stothert’s investigations influenced the work of Richard Burger, former director of Yale’s Peabody Museum, who compares the Inca road system to “the skeleton of a fish,” with its major north-south axis and many smaller subroads spreading east and west. As far back as the 1970s, Burger, a noted authority on Machu Picchu, walked sections of the road in northern Peru, and he likens it to the Roman road system in audacious scale and purpose. Like the Romans, the Inca needed to move their professional army quickly over long distances. The road also offered a unique communication medium: A corps of imperial messengers, the *chaski*, ran in relays, passing spoken messages 150 miles a day between Quito, one of the northernmost points of the empire, and Cuzco. Also, the road served as a conduit for products that symbolized the four corners of the Inca world and its immense wealth—feathers and wildlife from the jungle, gold and silver from present-day Bolivia, massive stones pushed all the way from what is now Ecuador for use in temple construction, and beach sand transported from the Pacific coast to fill the ceremonial main plaza at Cuzco. The road itself was regarded as sacred, a tool for spreading worship of the sun god personified in the emperor.

Maria Eugenia Muñiz, an archaeologist from the Ministry of Culture in Cuzco, has surveyed stretches of the roadway in support of a multinational effort to receive World Heritage site designation for the Capac Ñan. (Unesco granted the designation in 2014.) In lower valley sections, Muñiz said, the trail was not only flat and straight, but beautiful, with “gravel and dirt packed down, with a canal accompanying it.”

And yet the real achievement of Inca engineers was putting the high in highway, with sections of the road running at 10,000, even 16,000 feet.

**“THE ROAD CLIMBS
5,000 FEET STRAIGHT
UP MOUNTAINS.
SOMETIMES IT IS
BUILT ON A STONE
LEDGE, JUST WIDE
ENOUGH FOR
A LLAMA.”**



Their ideal road traced a perfectly straight line across the high slopes of a hillside, above the risk of landslides and below exposed ridges. Drainage was vital, and the Inca poured labor into substrates, ditching and walls that held back erosion.

Much of the initial construction was done by slaves, prisoners of war and conscripted laborers, but for regular maintenance, the Inca made individual families responsible for short stretches. The emperor was obligated to repay the workers not with money—

the Inca didn’t have currency—but with a stipend of clothing, *chicha* (fermented-corn beer) and food. These were dispersed from official storehouses along the roads, which “connected the different regions,” historian Donato Amado Gonzales had told me. Potatoes and llamas from the high *puna*, or uplands, were traded for corn from the midlands, fruit and coca from the eastern jungles, and fish from the Pacific coast. The Capac Ñan integrated the empire, but also diversified it.

But the Great Road began to decay and disappear almost as soon as the Spaniards conquered Peru. Designed to be traveled by humans on foot and by llamas, it was torn up by iron-shod horses and tough mules. The collapse of centralized power reduced maintenance. Spaniards quickly built new roads suitable for horses and wagons. The one development that eventually rivaled the damage to the road by the conquistadors was the automobile, which led many people who formerly walked the old roads to abandon them, or, worse, cover them with asphalt. Others pulled up disused stonework to improve their houses. The once vast network of main roads and myriad connecting arteries—reaching some tens of thousands of miles at its peak in the 15th century—has declined to some 3,000 miles of visible road today.

But limited segments are in use. I saw people commuting on the section in Cajamarca, and Bolivians walking to market on a stretch of Inca road that runs across the Island of the Sun on Lake Titicaca. Villagers even make repairs, working collectively in the Inca fashion. In the Apurímac Valley of Peru, less than a day’s drive from Cuzco, four communities gather annually to rebuild an Inca suspension bridge made from woven-grass ropes—a tradition going back half a millennium. “Maintaining the bridge maintains their culture,” says curator Ramiro Matos, a Peruvian archaeologist and ethnographer at the Smithsonian National Museum of the American Indian, and a lead organizer of the exhibition. The bridge project, he adds,



exemplifies one way that the Capac Ñan lives: “It is the Inca Road today.”

Amado had walked me into the Cuzco ground, but when he departed after two hours, disappearing into the night at a brisk pace, I didn’t quit. I’d noticed a brass plaque embedded in the sidewalk just above Cuzco’s Plaza de Armas. The plaque read “Antisuyu.” A long arrow pointed uphill.

The east road. Antisuyu was what the Inca called the northeastern section of the empire. It included part of the Amazon Basin, a land they considered hot, dangerous and eerily flat. But Antisuyu was rich with things that don’t exist at 10,000 feet: fruits, fish, animals and endless forests. The Amazon tribes barely submitted to Inca rule, but were known for providing the Inca army with skilled archers.

I climbed up through the neighborhood of San Blas, now one of the hippest in Cuzco, the road to Antisuyu lined with bars, restaurants, hotels, bodegas and cybercafés. Shops sold

Marilyn Monroe silk-screen prints, paintings of the Virgin Mary and sweaters. I was thirsty but kept climbing, block after block. The modern street—overlaying the exact route and dimensions of the Capac Ñan to Antisuyu—continued as Cuzco thinned out

ANTISUYU INCLUDED PART OF THE AMAZON BASIN, A LAND THEY CONSIDERED HOT, DANGEROUS AND EERILY FLAT.

into a poor suburb, dark and smelling of animal manure. The road, sometimes paved in modern reproduced cobblestones, turned to concrete for a while. Late at night, sweating, I passed the ruins of Sacsayhuaman.

But where the road topped out and

At a street festival in Cuzco, the Peruvian band Show MaJazz parades down a section of the original Inca Road.

left the Cuzco Valley, the cobbles were suddenly bigger, smoother, darker. An illustrated signboard, part of an archaeological site, said these were the original cobblestones of the Capac Ñan; the foundation of the wall on my right was the original Inca retaining wall.

At one time, I later learned, there had been a *tambo* here, an ancient Inca rest house. Upon reaching Cuzco, lords of the Amazon tribes would have to stop here to dress in their finery. Their armies of archers would have worn exotic feathers, and trumpeted on shell horns as they made a dramatic entrance.

Finally, I turned back into town, descending again, and before midnight I was back into steep San Blas, footsore and happy. I popped into a quiet *restobar* decorated with posters of the Beatles and Jimi Hendrix. An Elvis look-alike came in and set up a microphone.

The road leading to this door had always been about connecting. About

new people coming great distances to see the center of the world.

I wonder if the archers felt satisfied, too, when they settled in, footsore, to drink their chicha.

After a week in upper Peru, I had acclimated to thin air, but only partly. Walking downhill was becoming easy, but uphill was still a problem, so in the early morning I hired a taxi to carry me into the high terrain southeast of the ancient capital. Hours later I was let off at a pass near 13,000 feet. A dirt road spiraled down the far side, but the driver pointed me up, to a spur between two peaks. I started up.

Very slowly up. Every breath seemed ripped out of my lungs, and reaching the next pass, clearly visible at 14,000 feet, took almost an hour. Two curious 12-year-old shepherd boys, dressed like skateboard punks, accompanied me for a while until they grew bored with my frequent stops.

Eventually I reached the top and, on the far side, found a flattened, cleared route through the grass, bordered with stones—the Capac Ñan. A few downhill minutes brought me to a complex of seven ruins, at least some of which may have been shrines. A young Peruvian archaeologist, Cesar Quiñones, was leading a dig here at Wanakauri, a ritual site guarding the entrance to the two great valleys—Cuzco and Urubamba—that were the heart of the Inca empire.

The small site itself was intriguing, significant in Inca creation mythology, but the real draw for me was the long stretch of Inca road that led down to the Cuzco Valley—“maybe the best-preserved road in the Cuzco region,” Quiñones said. It had the five features of typical Inca road-building, he pointed out: “Walls of containment and retention. A roadway three meters wide. Paving stones. Stairways. Cutting and filling of earth.” On the highest point, piles of stones and a flattened platform indicated a place of sacrificial activity. We spent an hour looking at the waist-high walls that remained from Inca buildings; priests

TREASURES OF THE INCA

A new exhibition showcases the civilization that engineered the Road

THE RUNNERS OF THE GREAT INCA ROAD

were hand-picked and conditioned from childhood, sustained by a diet of toasted maize, and stationed at intervals up and down the length of the thoroughfare. The *chaski*, or messengers, ferried everything from gemstones to tropical fruit, and even sprinted seafood from the Pacific Ocean to the emperor’s dinner plate in Cuzco, hundreds of miles away. (The fish was said to arrive fresh.) But the *chaski*’s most precious cargo may have been information. They transmitted verbal orders and carried knotted ropes and carved walking sticks encoded with intelligence for the Inca elite.

Much of this running was done in fiber sandals, like the 500-year-old pair that’s among 140 objects featured in “The Great Inka Road: Engineering an Empire,” the first comprehensive exhibition focused on the legendary byway, opening at the Smithsonian National Museum of the American Indian June 26.

The show highlights the vastness of the Inca territory. Among the artifacts is an oyster-shell belt from the Ecuadorean shore and a carved bowl meant to hold water symbolizing Lake Titicaca, 12,000 feet above sea level. But common motifs surface, including the ubiquitous llama: The only pack animals indigenous to the Americas, they lugged goods from salt to obsidian to psychotropic plants. The Inca, who recognized their own distinctive constellations, even saw llamas in the stars.

When the Spanish introduced mules, llamas fell out of favor. But the creatures’ significance lives on in artifacts as well as the contours of the road, which skirts prime llama pas-

ture land and includes the remains of corrals where pack trains rested.

Local people still use the pathway to network with neighboring communities and to seek spiritual communion, placing offerings along its route. “The Inca Road is a physical road, but also ideological and cosmological,” says Smithsonian curator and Peruvian archaeologist and ethnographer Ramiro Matos. “This is our legacy.” —**ABIGAIL TUCKER**



This golden llama amulet (1400-1500) may have been an offering at a roadside shrine. A cotton shawl (1500-1700) bears images of everyday life, including llamas.

Hiram Bingham called Machu Picchu “the most important ruin discovered in South America since the Spanish conquest.”

probably lived here, while important visitors ascended the road from Cuzco for celebrations.

Quiñones pointed to the trace of the Capac Ñan in the distance, descending like a pencil line across curved mountain slopes. He warned me to get moving: It was lunchtime and I had about eight miles of trail to cover, with an extra couple of miles of dirt road before I could expect asphalt, and a possible taxi. “It’s a very clear path,” Quiñones said, “you won’t miss it.” I tightened my shoelaces and started down the trail.

Nothing happened on my walk. Nothing at all. Rainstorms passed around me, loose horses challenged me but galloped off, cows ignored me, a shepherd girl in a fedora and homespun skirt passed by, refusing to look at me. Her pigs, cows and dogs moved very slowly up the dead center of the Capac Ñan.

I got lost twice, but the retaining walls would pop up in the distance, or a single, carved step would usher me back to the trail. Late that afternoon the passage petered out, I bushwhacked down to a mud road, and walked into the Cuzco Valley, where I found a taxi. It dropped me on the edge of the old city, where the road from Wanakauri joined the main road from the south, which arrived in central Cuzco with a final, perfectly paved section that touched like a tangent against the rounded walls of Qoricancha, the Temple of the Sun.

A couple of police officers pointed it out to me, without fanfare, as if it were an everyday occurrence to work next to a 500-year-old miracle.

Machu Picchu was neither the capital of the Inca empire nor the main destination of its roads. Part of the site’s great mystery is its obscurity: The Spaniards never found it, nor mentioned it in their chronicles, even as they sought and tore apart every possible repository of Inca treasures.









The site of Ollantaytambo includes Inca buildings that are among the oldest continuously inhabited in South America.

Machu Picchu's brooding splendor—untouched by the Spanish—also preoccupied the great Chilean poet Pablo Neruda (1904-73), who visited the site in 1943. "The Heights of Macchu Picchu," first published in 1946, became Neruda's paean to the genius of anonymous builders who created its looming ramparts. For Neruda (who uses a variant spelling for the site), Machu Picchu is the wellspring of a powerful indigenous culture:

Mother of stone, spume of condors.

High reef of the human dawn.

Spade lost in the primal sand.

The site's enduring hold on the poet's imagination, writes Neruda translator John Felstiner, is that it is "a human construction conforming superbly to raw, ineluctable nature: That is what gives Macchu Picchu its mythic aura."

According to Richard Burger, Machu Picchu was probably a "country palace" or imperial retreat built for one of the greatest Inca kings, Pachacutic, who reigned from 1438 to 1471. The Inca didn't leave much evidence behind. Hiram Bingham, the explorer and Yale professor who reached Machu Picchu in 1911, recovered primarily broken pottery, the remains of perfume bottles and what Burger calls "ancient beer kegs," large ceramic jugs. Burger suggests that the Inca "probably packed up their valuables and took them back" to Cuzco during the Spanish conquest.

Machu Picchu's monumental stones, some weighing perhaps as much as 150 tons, are the best evidence of the city's royal status. Only an emperor "could use stone masons and had an unlimited supply of labor" to build so well at such a remote location, Burger told me. Unlike Cuzco, which was looted and rebuilt by Spain, Machu Picchu had been overgrown by vegetation for 500 years, preserving it.



Tour Machu Picchu and other sights along the Inca Road at
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I traveled by taxi over the Andes and down into the Sacred Valley, arriving at the station of Ollantaytambo, where the little train that serves Machu Picchu lurches along the banks of the Urubamba River. But I wasn't going by train. Crossing the river on a narrow footbridge, I met the members of my hiking group—a family of Chileans and our guide, Ana Maria Rojas.

Before setting out to walk what is today the most famous of all Inca byways, I had consulted over cups of coca tea in Cuzco with Alain Machaca Cruz, a 31-year-old Peruvian who works with the South American Explorers Club. Machaca had trekked more Inca road miles than anyone I'd ever met, for his company, Alternative Inca Trails. He once did a 15-day expedition down the road to Antisuyu ("At least 19 or 20 days for you," he noted, after assessing my condition). He'd been born in a small Quechua-speaking village on the Capac Ñan southeast of Cuzco. "The *camino inca* was the prime means of transport and communication in an era with no other," he told me. "My parents, when bringing products to market, they had to use it. There was no other way." By comparison, Machaca said, "There are very few people who walk today." He quoted his parents, first in Quechua, then Spanish: "Now that we have cars, we don't walk."

By contrast, the famous trail to Machu Picchu, he noted, is "totally saturated. You have to reserve eight months in advance." Tourism promoters helped to popularize the name "Inca Trail" for the path to Machu Picchu; 500 people a day now crowd onto the route, often unaware that it is just "43 kilometers of what was the 40,000-kilometer system" of the entire Inca Road, Machaca said. Richard Burger agreed, telling me that the relatively obscure road to Machu Picchu gets far more traffic today than in Inca times, when only a small elite—the emperor and his court, retainers, and servants—would have used it.

But crowding is relative. On the trail that day, I started uphill with the Chilean family. The husband was an explosives engineer and fitness buff who

conquered the mountain easily. His wife was less equipped for the terrain, and slower, but their twin teenagers kept everyone in good spirits. Perhaps once an hour, we would overtake another group resting, or be overtaken while we paused.

We trekked along the side of the steep Urubamba Valley. There were periodic grunts of the you've-got-to-be-kidding-me variety when Rojas



SUSPENDED IN TIME

During the Smithsonian Folklife Festival this month, Peruvian artisans are building a 70-foot-long bridge on the National Mall. The Andean grass used in its construction was harvested last November, before the rains. Craftsmen moistened, pounded and braided the long-fibered *ichu* into 500 ropes of varying thicknesses. In Washington, a dozen artisans, guided by a bridge master, are taking a week to tie and weave the ropes into the span, which can support the weight of ten people. Today, traditional Inca Road bridges have nearly vanished from the Andes. Crossing a river by suspension bridge, says Peruvian project coordinator Roger Valencia, requires trust. "You feel it swaying in the wind. Then—you get used to it." A.T.

In Ollantaytambo, along the route to Machu Picchu, a local woman (above right) prepares beans to sell in the plaza, while a farmer (bottom) hoists a load of dried-grass forage for his herd of cows.

pointed out the trail ahead, running across some distant ridge as a dark line in the dense vegetation.

The trail itself wasn't as wide as those I'd seen in Cajamarca or Wanakauri, but like everything at Machu Picchu, it had been eerily preserved by centuries of obscurity and abandonment. I paused to examine a few steps carved out of the rock. "They clean it from time to time, but not much more than that," said Rojas. She gave concise answers about Inca history, knew her royal chronology and names, and carried a notebook full of useful details about architecture. She called Hiram Bingham the "scientific discoverer" of Machu Picchu, neatly eliding a popular argument in Peru that Bingham was not the first person to see the ruins, because grave robbers and local farmers had been there first. Still, as Rojas told the Chileans, Bingham "showed the heritage of Peru to the world."

She didn't happen to mention another traveler who came under the spell of Machu Picchu. In 1952, Che Guevara—then the questing Argentine medical student Ernesto Guevara—arrived here during a journey that began by motorcycle through Latin America. Radicalized by the poverty he witnessed on his odyssey, Guevara experienced Machu Picchu as an ultimate symbol of resistance. At the site, he wrote in *The Motorcycle Diaries* (published posthumously in 1993), "We found the pure expression of the most powerful indigenous race in the Americas—untouched by conquering civilization." Machu Picchu owed its force, he added, to the fact that the mountain redoubt had "sheltered within its hold the last members of a free people."

We passed more groups that afternoon, and then went up a steep trail into an open bowl, where a dozen Peruvian workers were laboriously trimming the grass from a score of Inca terraces, using

CONTINUED ON PAGE 108





PLAN YOUR LEGACY

MARY HOPKINS and her husband shared a passion for learning. As a tribute to him, Mary made a bequest to endow internships at the Smithsonian National Museum of American History and the National Museum of the American Indian.

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Inca Road

CONTINUED FROM PAGE 106

machetes. Above loomed a complex of gray stone houses, Winaywayna (translated from the Quechua, “forever young”). Now we struggled up into the remains of impressive ceremonial sites and a dozen stone houses with trapezoidal windows. The stonework was in the best condition of any Inca ruin I had ever seen. We were effectively alone in what seemed a little precursor complex to Machu Picchu.

Karen Stothert had walked here in 1968. The trail was in bad condition and overgrown, and her group’s progress was so slow that when they finally reached Winaywayna, they hadn’t had water for cooking for two days. But in the ruins they found water still flowing in the old Inca fountains. “We had two dinners in a row,” Stothert recalls, “with butterscotch pudding the first time and chocolate pudding the second. I gave thanks to the Inca for good engineering.”

Our modern accommodations were instead a tight cluster of wall tents for backpackers that night.

Rested, we finally crossed over the last pass, and entered through the Gate of the Sun, the Inca portal to Machu Picchu. There Rojas left us in silence for a few minutes, where we joined the other sweaty backpackers gazing down on the ruins that now define South America. From about a mile away, the connection between road and town, empire and emperor, was blazingly clear.

The ghost of Che Guevara seemed to hover here as well.

The lost city was down there, a perfect, peaceful retreat that sat in a warm location over a lush valley. Of course emperors would want to be here—everyone wanted to be here. Thanks to the train, more than a million people a year now come to Machu Picchu, to breathe in the atmosphere, the sacred majesty and the raw power of the site. When the greatest empire in the Americas stood at its peak, this was the view.

“Let’s go,” Rojas said. A road is for walking, after all.



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Zebrafish

CONTINUED FROM PAGE 63

The team's paper notched a number of breakthroughs, but it was the technical marvel of brainwide recording that drew the most attention. Never before had scientists imaged activity in all the neurons of a living animal. "The technology was there to do that experiment, but no one had," Joseph Fetcho, a Cornell professor who made many of the seminal advances in zebrafish neuroscience, told me. "Only Florian was nutty enough. It's sort of his whole, 'Go big or go home' approach to life."

When I showed up at Engert's lab on the second floor of Harvard's BioLabs building, he greeted me and said, "I'm going to show you something really funny." He led me out of the building and down an asphalt path to a side door of the Harvard Divinity School. A laminated card on the door frame said, "No Smoking Within 25 Feet of Building Entrance." But on the door itself was another sign: "Not an Entrance."

He watched my face to make sure I registered how the second sign could be reasonably read to negate the first. Then he burst into a tittering, high-pitched laugh. When I asked if I could take a photo, he eagerly assented, making sure both signs were still visible. Then he lit up an American Spirit cigarette, blew smoke at the eaves of Divinity Hall, and flashed the camera his best naughty-boy smile.

Engert was enacting for me, in miniature, one of his favorite public personas: the rake in a comedy of manners, the charmer whose bad behavior is so finally harmless that only his accusers look foolish in the end. The stories he likes to tell about himself all involve narrow escapes from one variety or another of fussbudget or prude. Harvard, with its hallowed reputation, big egos and tweedy fashion imperatives, offers him a particularly effective foil. When colleagues complained about his skating through the BioLabs building, maintenance staff put up "No Rollerblading" signs. They came down after he made tenure.

I noticed a wood-handled leather whip behind Engert's desk one afternoon, and when I asked what it was doing there, he grabbed it, sprung to his feet and unleashed an earsplitting crack that launched a pair of startled grad students out of their seats. "You see how they react, how they are suddenly working faster?" he joked. In truth, someone gave it to him in irony. Engert is known for the very long leash he gives lab members. The most inventive science, he feels, comes in an environment in which brilliant independent thinkers have free rein to chase their most fanciful ideas, even if they fail.

Adam Kampff, an undergraduate astrophysics major, was weighing a switch to neuroscience for a PhD in 2002 when Engert gave him a Harvard credit card and told him to build the lab

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a two-photon microscope, a contraption of lasers and mirrors whose assembly requires a magnum of technical dexterity. The microscopes, which fire two pulses of infrared light at a single point, are valued for the clean images they take of fluorescent-dyed cells, like the ones that flash green in genetically modified zebrafish.

Engert then jetted to Berkeley, where he'd just finished a postdoctoral fellowship, so he could ride his Honda Shadow cruiser motorcycle cross-country back to Cambridge.

"While he was away I think I spent about \$300,000," Kampff told me. "Look-

ing back, you go, 'Wait, that's crazy,'" said Kampff, who stayed for a PhD and postdoc with Engert and is now a lab director at the Sainsbury Wellcome Centre, a neuroscience research institute at University College London. "But it was the best thing that ever happened to me."

For the 2009 public talk that Engert delivered as part of his tenure bid, a colleague advised him to skip the muscle shirt and dress up. Engert did—in lederhosen. When he took to the stage in leather shorts and knee socks, he assured the packed lecture hall that contrary to appearances, he had taken his colleague's advice to heart. "This is the formal dress of the Bavarian tribes," Engert said, as the room flooded with laughter, "and it's a sign of the highest respect for any audience."

Florian was once a quiet, comic book-devouring homebody, says his sister Katharina. The two grew up in Munich's Schwabing district, a Bohemian enclave animated by students from nearby universities. Their father was a baker who founded a local ice-cream chain, and their mother sold her family's hair salon to raise the children. For a spell they all lived above the flagship Engert Ice. Kids were always coming around, but "you never knew if they were your friends because of the ice cream or because they liked you," says Katharina, now a primary care doctor in Munich.

When Engert was in high school, their father, anxious about his English grades, sent him to London for a year of language study. Engert came home extroverted and self-assured. He soon found himself in a crowd of self-styled cold war nihilists who believed in living for the moment because a nuclear catastrophe was apt to wipe out the human race before any of them reached 30.

Big questions about the origins of the universe excited Engert, and physics seemed to have answers. By his senior year at Munich's Ludwig Maximilians University, however, the field's two pillars—elementary particles and astrophysics—had come to feel "too detached from daily life," he told me. His family's next-door neighbor was a brain

How a Chicago Doctor Shook Up the Hearing Aid Industry with his Newest Invention

New nearly invisible digital hearing aid breaks price barrier in affordability

Reported by J. Page

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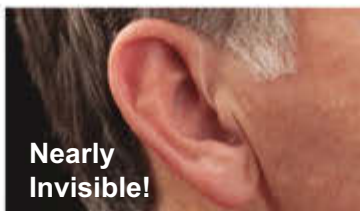
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researcher, and he told Engert that neuroscience needed physicists, that the field's future hinged on the invention of new tools to peer into the brain.

As a graduate student and postdoctoral researcher at the Max Planck Institute for Neurobiology outside Munich and at the University of California, Engert built gear for important discoveries into how neurons in rats and tadpoles change in response to visual and electrical stimulation—changes thought crucial to learning and memory. He spent two years designing a custom two-photon microscope whose laser, if mishandled, could zap retinas. In a typical gesture,

Congress. The National Institutes of Health awarded \$46 million in BRAIN grants last fall, and agencies as disparate as the National Science Foundation, the Defense Advanced Research Projects Agency and the Food and Drug Administration are backing research aligned with the initiative's goals. In the private sector, companies like Google, GE and GlaxoSmithKline have devoted more than \$30 million to the mission.

Scientists involved with the effort envision a stepladder approach, working up from roundworms (300 neurons), baby zebrafish and fruit flies (100,000 each) to mice (75 million) and monkeys (6 billion for the macaque) be-

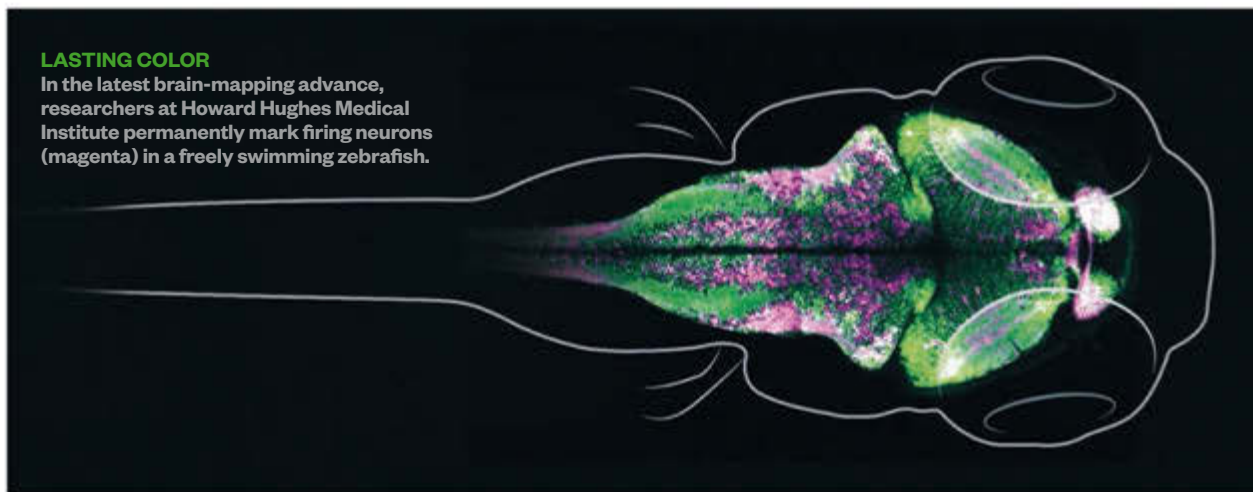
nowhere, we went to the tenth floor."

It wasn't until Engert's paper—and another, the next year, from Misha Ahrens, who made zebrafish mind-reading dramatically faster—that "We thought, OK, this initiative could be possible," Chun said. "The leap of faith they made was tremendous."

She expects the payoffs for human health, for conditions like epilepsy, could come in just five years. Treatments for less-understood ailments—from Parkinson's and Alzheimer's to autism, schizophrenia and post-traumatic stress disorder—are further off, but hardly out of reach. By comparing the brains of healthy people, cell by cell, with those

LASTING COLOR

In the latest brain-mapping advance, researchers at Howard Hughes Medical Institute permanently mark firing neurons (magenta) in a freely swimming zebrafish.



Engert duct-taped the lab's safety goggles to the wall and posted a sign above them that said, "Only for Wimps."

His gift for juggling business and pleasure has fueled its share of intramural comment. In 2002, Mu-ming Poo, in whose lab Engert worked as a postdoc, wrote a letter lashing lab members for laziness. "There may be a few rare lucky fellows like Florian, who . . . can enjoy life for a while and still get a job offer from Harvard," Poo wrote. "No one else in the lab has Florian's luxury to play around."

The White House launched its neuroscience mission, known as the BRAIN Initiative (for Brain Research through Advancing Innovative Neurotechnologies), with a \$100 million request to

fore summiting the Himalaya of the human brain (nearly 100 billion). In some ways, the initiative is now proceeding on all those fronts simultaneously. Scientists are studying parts of the human brain while taking a more holistic approach in lab animals. And they are experimenting with an array of tools—lasers, ultrathin probes, chemical tags, high-tech ultrasound, light-activated molecules, next-generation fMRIs and PET scanners—in hopes of recording at high resolution from deep inside *non-transparent* brains.

Chun, who helped convince the White House to launch the BRAIN Initiative, has likened the zebrafish work to an express elevator. "We were still on the first floor, trying to get to the second floor," she says. "Then out of

with neural disorders, scientists may be able to isolate the circuits whose breakdown prefigures disease. Those discoveries could spur development of new drugs and therapies. Zebrafish, which are vertebrates and thus have brains similar to our own, are already leading the way. They're being used to test drugs and to study the neurobiology of anxiety, sleep and alcohol abuse.

Engert, though, is happy to leave such pursuits to other scientists. He says he never set out to image activity in a brain's every cell. It was just an add-on to the "Matrix" experiment—a lark to silence a debate about whether such recording was even possible. He is driven by questions without obvious applications: How does a zebrafish react to certain kinds of stimuli? Which neural cir-

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cuits fire when fish swim, hunt or flee predators? What experiments offer the best look at zebrafish learning?

He wants the public and politicians to value neuroscience for the same reasons they do the Hubble Space Telescope, the Large Hadron Collider or the Mars rover. None of these touch everyday lives directly, but they are funded because there is beauty in unraveling the universe's mysteries. He believes that quest will be set back if the BRAIN Initiative is oversold. "The problem," he says, "is that if we don't solve Alzheimer's and Parkinson's, it will look like we failed at our appointed tasks and people will take the money away and say, 'Nice try, no cigar.'"

As for the philosophical questions raised by this work—whether studying the brain will teach us anything about the nature of human consciousness, or the idea of a soul; whether science will one day reduce the stuff of our humanity to a cold calculus of algorithmic code—he's agnostic.

We met one evening at the bright purple house where he lives with Polina Kehayova, a drug researcher who moonlights as a Boston Symphony soprano, and their 6-year-old daughter. Over lentil stew, Engert recalled something the MIT linguist Noam Chomsky once said: "If we can't explain why a cockroach decides to turn left, how can we explain why a human being decides to do something?"

"Even the lowliest insect is a spectacularly well-adapted instrument that's more complicated and more interesting than any computer," he told me. "I mean, wouldn't you like to know how its brain works?"

After a few days with Engert, I did make some headway into how *his* brain works. His goals, it turns out, aren't as awkward a fit for the BRAIN Initiative as he sometimes pretends, even if his motivations are different. Live images of a brain's every flashing neuron could hold tremendous power, he says, if scientists also saw the wires: the thin fibers along which neurons send signals. Then you'd know whether specific neurons were talking to each other—and

maybe what they were saying, too.

On campus one afternoon, one of Engert's grad students, Mariela Petkova, walked me across a courtyard to the lab of Jeff Lichtman, a professor of molecular and cellular biology. Inside a windowless room, an entire zebrafish brain had been stiffened with resin and cut by a diamond knife into 30,000 super-thin slices. Scanning electron microscopes are imaging each of the slices, and eight undergraduates and several volunteers—including Petkova's mom, over the Internet from Bulgaria—are tracing the neural "wires" by hand from slice to slice. Another professor, Constance

WHEN ENGERT'S WORK IS DONE, HE WILL HAVE **NOTHING** **MORE—OR LESS—** **GLORIOUS THAN** **A VIRTUAL FISH.**

Cepko, will do additional tracing by watching how fluorescent viruses spread through a brain. Once the wiring diagram is complete, Engert will lay his map of flashing neurons on top of it. Haim Sompolinsky, a theoretician, will then analyze the flows of neural traffic across the wires, in search of principles that link those traffic patterns to specific fish behaviors.

When Engert's work is done, which he says could take 20 years, he will have nothing more—or less—glorious than a "virtual fish": software that mimics the complete workings of a zebrafish brain. Scientists could dial up any mix of sensory inputs—water temperature, a pattern of light, the path of nearby prey or predator—and the software's algorithms would show not just how a real fish would respond, but what happened in its brain, millisecond by millisecond and cell by cell, before it did so.

He will have figured out, in essence, why the zebrafish turns left.

Friday mornings bring the only jot of structure to Engert's lab: the weekly all-hands meeting, where 20 grad students and postdocs brief one another on their research. On the Friday in mid-December when I was around, Engert zipped in on skates, wearing a T-shirt with an image of Snoopy flexing a bicep and the words "Welcome to the Gun Show."

The professor took a seat at the head of the table and bounced up and down on the pneumatic chair, like a child goofing around at a parent's desk. "Wow," he said. "I feel like I'm in charge."

But just as quickly, he slipped off the chair and into a corner of the room, where he assumed a role less often seen in public: that of the quiet and patient cheerleader for his researchers, off-trail explorers he equips with gear and then dispatches—*call when you can!*—into the starfields of the mind.

The young men and women took turns clicking through slides of their latest zebrafish work: Here are the neurons that flash when the fish get a mild shock. Here, the visual cues their brains home in on to estimate motion. Here, a high-speed camera on an upside-down milling machine, a new tool that may soon let lab members track brain activity in free-swimming fish.

Engert posed a few gentle questions, but mostly there was encouragement: "Amazing!" "Very nice—the beast in action!" "Look at that! Perception, cognition and consciousness here. The soul of the fish!"

One grad student pointed out that the in-line skates on each of Engert's feet were different colors and makes. Engert peeled off the skates to reveal socks—gray on one foot, black on the other. Then he took off his socks. On his left foot, the big toenail was painted red, and the others purple. On his right foot, the big toenail was purple, and the others, red. When his daughter had exhausted her mother's toes in a recent nail polish experiment, her father had offered up his.

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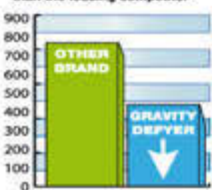
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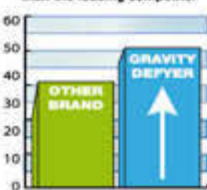
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Ask Emily

By Emily Thacker

Dear Emily: I'm allergic to perfumes, chemical smells plus many other things. Cleaning has gotten to be a problem as manufactures seem to think everything has to have a fragrance in their product. Can you recommend to me a natural way to freshen my room and air?

— B.A., Newport, PA

Dear B.A.: Vinegar is the cleaner of choice for those with allergies, asthma or a sensitivity to harsh chemicals. Cleaners you make yourself cost pennies, instead of the dollars supermarket cleaners cost. And, what is much more significant, the compounds you put together are safe, natural and easy on the environment.

I will give you my natural Fresh Air freshener from page 108 of my latest book *The Vinegar Anniversary Book*. Put the following into a pump spray bottle: 1 teaspoon baking soda, 1 tablespoon white vinegar and 2 cups of water. After the foaming stops, put on the lid and shake well. Spray this mixture into the air for instant freshness.

Hello Emily: I have a situation that I need additional guidance on and am hoping you will be able to assist me. I have a natural limestone walled shower and a natural slate shower floor. I also have very hard water that leaves behind white powdery mineral deposits that stain the stone. The mineral deposits do not come up with steam, scrubbing or with natural stone cleaner. I've read many very conflicting reports on the use of vinegar on natural stone. Any suggestions, resources or insights that you can offer would be very much appreciated. Thank You, — C. A., King of Prussia, PA

Dear C.A.: Yes, vinegar could eventually etch the limestone and slate. And, yes it will do a very good job of removing the powdery mineral deposits in your shower. You will probably find that anything that will dissolve the mineral deposits will also dissolve the limestone, as they are both composed of the same material. You might find that a quick rinse with vinegar, followed by a thorough rinse with lots of cool water will minimize the damage it could do. You may also want to look into the benefits of a water softener to minimize the problem.

Emily Thacker is the author of over 17 books. Her best-selling books about common household products have appeared in newspapers and publications across the U.S. including USA Today, Parade Magazine, The History Channel Magazine and The Saturday Evening Post.

Send Questions to: Emily Thacker C/O James Direct, Inc., 500 S. Prospect Ave., Box 980, Hartville, Ohio 44632. If interested in Emily's latest book and a FREE Special Bonus please see the article on this page titled "Vinegar, Better than Prescription Drugs?"

Vinegar, Better than Prescription Drugs?

Thousands of years ago ancient healers trusted apple cider vinegar, and modern research shows - *vinegar just might be a wonder cure!*

In fact, apple cider vinegar's biggest fans believe this golden liquid can help solve the most troublesome of human afflictions.

Since even the earliest of times a daily vinegar cocktail was used to help control appetite to lose weight and continue good health.

And now after years of continued research all across the globe, over 1000 new vinegar super-remedies and tonics are available in the brand new 168-page *Vinegar Anniversary Book* by famed natural health author, Emily Thacker.

From the Bible to Cleopatra to the fierce Samurai warriors of Japan, vinegar has been documented as a powerful tonic to ensure strength, power and long life.

Today's research studies and scientific reports continue to review the healing powers of vinegar to maintain good health and well being.

Even grandma knew that her old remedies worked even if she wasn't able to explain why. And scientific research confirms this.

For instance, grandma said putting diluted vinegar in the ears would ward off infections. The American Academy of Otolaryngology's doctors - who specialize in treating infections like swimmer's ear - now recommend using a vinegar mixture as a preventative.

The Yale-New Haven hospital uses vinegar as a hospital disinfectant. When after-surgery eye infections became a problem, their Department of Bacteriology solved it with vinegar.

Food poisoning? Some doctors suggest that regular vinegar use can prevent it!

You'll get easy recipes that mix vinegar with other common household items to help: ***calm an upset stomach, ease leg cramps, soothe sprained muscles, control appetite to lose weight, relieve coughs, banish nausea, arthritis pain, make hiccups disappear, cool a sunburn, boost memory, reduce sore throat pain, relieve itchy skin, lower blood pressure & cholesterol, eliminate bladder infections, chase away a cold, treat burns, reduce infection, aid digestion, improve memory, soothe sore feet, treat blemishes & age spots, remove corns & calluses, replace many household cleaners.***

50 years ago a daily dose of an apple cider vinegar and honey tonic was used to ease arthritis. During the last 30 years or so, many wonder drugs have replaced this time-tested home remedy. Now vinegar, along with countless other old-time tonics, have new supporters including many medical professionals. *The reason?* Almost everybody has experienced the negative side of some of the powerful new drugs.

Strep and Staph infections? Vinegar is a powerful antiseptic and kills even these dangerous bacteria on contact.

Feel good and look good with these hair and skin-friendly vinegar remedies.

You'll learn when you should *and should not* use vinegar.

Join readers like L.S. of Monroe, N.C. who says "*Thanks, this book is wonderful. A real life saver for me!*"

Find different ways to combine vinegar with common foods like lemon juice, blueberries, onion, strawberries, garlic, honey, ginger and more to create recipes to help improve health and quality of life.

All new ideas to put

vinegar to work around the home to clean, disinfect and eliminate mold and mildew. Great for those with allergies or asthma!

Save money as you put Emily's latest discoveries to the test!

Yes that's over 1000 tried-and-true remedies and recipes in this handsome collector's edition and it's yours to enjoy for 90-risk free days. That's right, you can read and benefit from all 168-pages without obligation to keep it.

To get your copy of the *Vinegar Anniversary Book* direct from the publisher at the special introductory price of \$12.95 plus 3.98 shipping and handling (total of \$16.93, OH residents please add 6.5% sales tax) simply do this:

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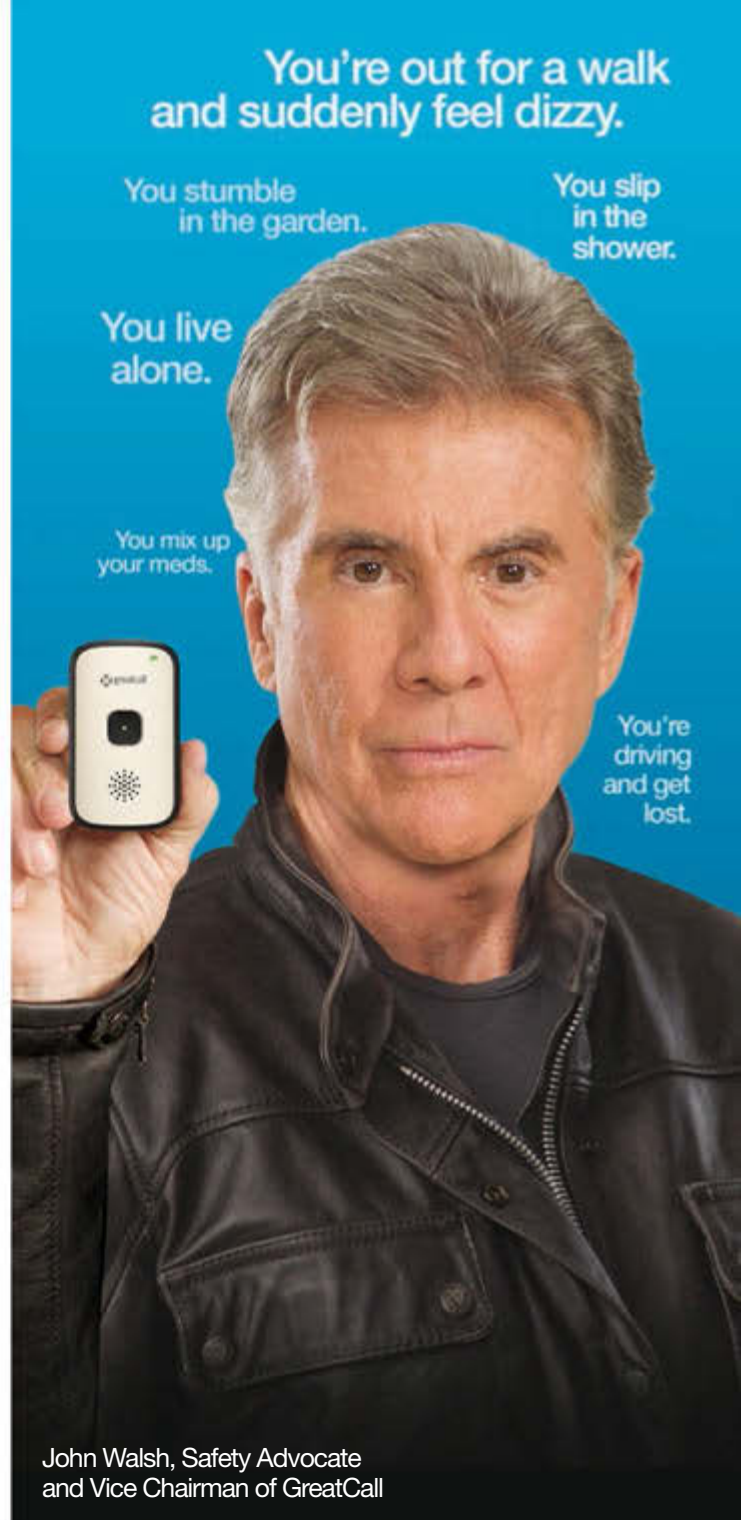
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Pompeii

CONTINUED FROM PAGE 37

swathed in fabrics of gold, green and orange, their faces exquisitely detailed, against a backdrop of white columns. I asked Vanacore how the frescoes had been allowed to deteriorate so markedly. "It's a complicated question," he said with an uneasy laugh, allowing that it came down to "missing the daily maintenance."

The Villa dei Misteri, which reopened in March, may be the most impressive evidence to date of a turnaround at Pompeii. A recent Unesco report noted that renovation work was progressing on 9 of the 13 houses identified as being at risk in 2013. The achievements of the Great Pompeii Project, along with the site's routine maintenance program, so impressed Unesco that the organization declared that "there is no longer any question of placing the property on the World Heritage in Danger list."

Still, despite such triumphs, Pompeii's recent history of graft, squandered funds and negligence has many observers questioning whether the EU-financed project can make a difference. Some Italian Parliamentarians and other critics contend that Pompeii's ruins should be taken over in a public-private initiative, as at Herculaneum. Even the Unesco report sounded a cautious note, observing that "the excellent progress being made is the result of *ad hoc* arrangements and special funding. The underlying cause of decay and collapse . . . will remain after the end of the [Great Pompeii Project], as will the impacts of heavy visitation to the property."

To Antonio Irlando, the architect who is Pompeii's self-appointed watchdog, the only solution to saving Pompeii will be constant vigilance, something that the site's managers and the Italian government have never been known for. "Italy was once leading the world in heritage conservation," he says. Squandering Unesco's good will would be, he declares, "a national shame." ○

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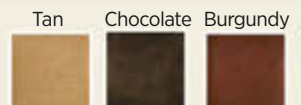
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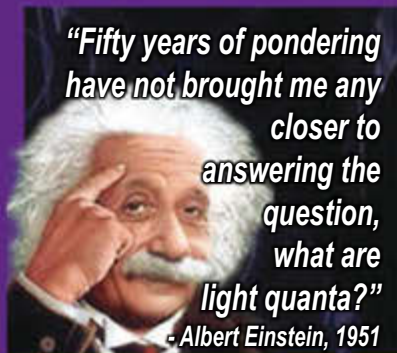
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Mockingbird

CONTINUED FROM PAGE 49

no land, we had nothing. We didn't have electricity until I was in the 12th grade, in the fall of 1947. I studied by oil lamp."

The work paid off. After theology studies at Emory and Northwestern, and parishes in Mobile and Fort Walton Beach, Florida, and civil rights struggles, he became pastor of this Methodist church.

"We took in racism with our mother's milk," he said. But he'd been a civil rights campaigner from early on, even before 1960 when in Talladega he met Martin Luther King Jr. "He was the first black person I'd met who was not a field hand," he said. "The embodiment of erudition, authority and humility."

Rev. Butts had a volume of Freud in his lap the day I met him, searching for a quotation in *Civilization and Its Discontents*.

I told him the essay was one of my own favorites, for Freud's expression about human pettiness and discrimination, "the narcissism of minor differences"—the subtext of the old segregated South, and of human life in general.

His finger on the page, Rev. Butts murmured some sentences, "'The element of truth behind all this . . . men are not gentle creatures who want to be loved . . . can defend themselves . . . a powerful share of aggressiveness . . . ' Ah here it is. '*Homo homini lupus* . . . Man is a wolf to man.'"

That was the reality of history, as true in proud Monroeville as in the wider world. And that led us to talk about the town, the book, the way things are. He valued his friendship with H.B. Williams: the black teacher, the white clergyman, both in their 80s, both of them civil rights stalwarts. He had been close to the Lee family, had spent vacations in New York City with Nelle, and still saw her. An affectionately signed copy of the novel rested on the side table, not far from his volume of Freud.

"Here we are," he intoned, raising his hands, "tugged between two cultures, one gone and never to return, the other being born. Many things here have been lost. *To Kill A Mockingbird* keeps us from complete oblivion."

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Par Avion

Sometime this summer the Swiss are planning to take air mail to a whole new level—with American-made drones. Partnering with Swiss Post and Swiss WorldCargo, the Silicon Valley start-up Matternet will fly five quadcopters through authorized air corridors carrying 2.2-pound parcels.

The autonomous drones, equipped with cloud-based routing software, basically fly themselves, winding around buildings and over mountains at an altitude of 165 to 330 feet. If they falter, parachutes deploy for soft land-

ings. Buzzing at 30 miles per hour, the roughly three-foot-long vehicles can travel 12 miles on a single battery charge. A commercial version of the drone, the Matternet One, is now available for \$5,000.

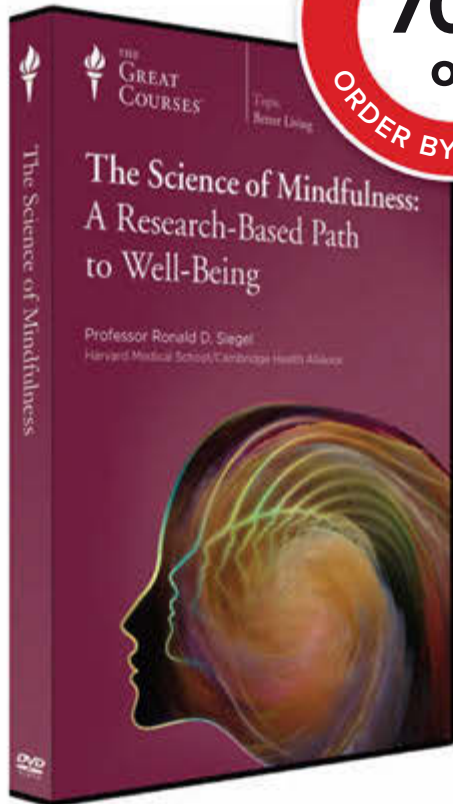
Swiss WorldCargo executive Oliver Evans says that the receptiveness of Swiss officials to drone technology makes his country an ideal testing ground. The U.S., so far, is less welcoming; FAA regulations require that civilian drones stay in sight of their operators and fly no higher than 500 feet.

The pilot project has applications

beyond Switzerland. More than one billion people worldwide are isolated by poor roads, and Matternet aspires to reach them. Its drones have already delivered medicine to villages in Haiti, Bhutan and Papua New Guinea.

“The first time I saw a small drone, I thought this may be the next big revolution in transportation,” says Matternet co-founder Andreas Raptopoulos.

The question of whether such drones will deliver on his hopes remains up in the air. Even so, says Raptopoulos, it’s cheaper than building roads. —SASHA INGBER



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Dear Subaru,

My wife and I took a trip for some night photography. In between all the photos, we were able to take some quick naps in our Subaru. It's nice to have a reliable friend that's always there for our adventures...and a little sleep. – Win O., Portland, OR.

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